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ORIGINAL ARTICLES.

SOME ASPECTS OF THE TUBERCULOSIS PROBLEM IN LIFE ASSURANCE.[1]

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Although this Society has now been in existence for twenty-five years, the attention devoted to the subject of tuberculosis has been small in comparison with its importance. Of course it has been touched upon in various papers of a general nature, but only on three occasions has there been one dealing specially with tuberculosis, namely: "On Pleurisy with Effusion in Relation to Life Assurance," by Dr. Hector Mackenzie, in 1897; on "The Significance of Tuberculous Glands and Joints in Early Life on Subsequent Life Assurance," by Mr. W. McAdam Eccles, in 1901; and "Traumatic Tuberculosis, Pneumonia, and Pleurisy," by Dr. Parkes Weber, in 1910. Much new light has been thrown on the problem of tuberculosis in its relation to Life Assurance during recent years, both from the medical and the actuarial sides: it seems particularly desirable to consider the following points: I. The Significance of a Tuberculous Family History. II. The Question of "Contact Infection." III. The Assurance of Individuals with a Personal History of Tuberculosis.

[1] A portion of an address introductory to a discussion before the Assurance Medical Society, November 5, 1919.

Tuberculous Family History.

It is, I suppose, a fact of universal experience that tuberculosis "runs in families." The frequency with which three, four, or even more members of a family die of this infection is far greater than could be accounted for by any fortuitous incidence of the disease. But if this fact is incontrovertible, its explanation is still a matter of debate. Is it a question of inherited "predisposition," a "lack of resistance," or is it rather a contagion spreading from member to member through a family? If one accepts the modern view that tuberculosis is a universal infection, and that the vast majority of individuals are definitely infected to some degree in early life, then the former alternative—that of an inherited "lack of resistance"—seems the more likely explanation of these afflicted families.

But even if this "hereditary" view is accepted, it must not be assumed that each individual of a tuberculous family is specially susceptible to this disease. In other words, the inherited impairment need not be, and, in fact, does not appear to be, distributed uniformly among all the collaterals of the family. For this reason we must guard against the assumption that a tuberculous family history necessarily renders the proposer an impaired life, acceptable only at special rates. The question is obviously one for decision by the actuary rather than the medical man.

Some light is thrown on this problem by an investigation conducted by Rusher and Kenchington, with the assistance of the late Dr. E. M. Light.[1] They investigated the mortality in a group of some 80,000 proposers with a family history of tuberculosis, the total experience comprising 622,462 policy-years, with an average observation-period for each proposer of nearly eight years. The data were grouped in various ways, according to age at entry, sex, nature of insurance (whole life and endowment), and details of family history—whether the tuberculous deaths were in lineals (father and mother), collaterals (brothers and sisters), or lineals and collaterals. The results, expressed in ratios of actual to expected deaths, varied considerably in different groups, for details of which reference must be made to the original paper, but the chief findings may be roughly summarized as follows:

(1) The mortality experienced in the early years of assurance was heavy, especially for young ages at entry. In other words, *the effect of a definite tuberculous family history shows itself mainly in the younger ages at entry and the early years of assurance.*

(2) After the first five years of assurance, the excess mortality is less marked, especially in the case of endowment assurances, in which it comes well within normal limits. The latter fact suggests the importance of "selection" by the assured—of the "bad life" more

[1] See *Journal of the Institute of Actuaries*, 1913.

or less consciously choosing a whole-life assurance rather than an endowment.

(3) As regards the relative importance of lineals and collaterals in this respect, the authors "have no hesitation in expressing the opinion that at least as much attention—if not more—must be given to a history of tuberculosis amongst brothers and sisters as amongst parents."

(4) The degree of tuberculous family history is of much less importance than the age at entry, and may, in fact, be said to have no practical value for assurance purposes over age thirty-five at entry.

In 1914 appeared an elaborate Medico-Actuarial Investigation, embodying the combined experience of the leading American companies with regard to various classes of special risks. The findings with regard to tuberculous F.H. are particularly interesting, as in most of the groups, in addition to the age at entry, the *weight*, and, in some cases, the *height*, were taken into account.

Here, again, anything approaching a complete summary has been beyond my powers, but the following seem to be the most interesting points brought out in this investigation:

(1) F.H. of one parent and one collateral: at young age of entry (15-29) decided increase in mortality, *especially in the case of underweights.* This excess mortality is largely due to phthisis, the proportion of which to total deaths is closely related to degree of underweight. (See table.)

Weight.	Age at Entry, 15 to 29.			Age at Entry, 30 to 44.		
Deviation from Standard in Pounds.	Total Deaths.	Deaths from Phthisis.	Ratio.	Total Deaths.	Deaths from Phthisis.	Ratio.
−45 to −25	59	31	53 per cent.	302	93	31 per cent.
−20 ,, − 5	658	294	45 ,,	911	198	22 ,,
0 ,, +20	475	134	28 ,,	670	65	10 ,,
+25 ,, +45	71	5	7 ,,	216	4	2 ,,

(2) F.H. of one parent or one collateral (brother or sister). Mortality high in younger ages at entry among lightweights. This F.H. is of comparatively little importance except at younger ages at entry (below 35), and may be disregarded above this age.

(3) For entry under 30, a record of tuberculosis appears of more consequence in case of brother or sister than of a parent, a result perhaps explicable by more rigid selection in latter cases.

(4) Tall underweight men (5.11—6.2) showed a considerably higher mortality than short and medium underweights (5.2—5.10).

(5) "Except at entry ages under thirty, the mortality has generally been lower than normal—a result explainable only on the supposition that an unusually high standard of physical fitness has been required. As this care in selection was unquestionably accentuated in the case of young lightweight applicants, the unsatisfactory results among such as were accepted deserves special emphasis."

The logical conclusion from these data is that, in estimating the importance of a positive F.H. of tuberculosis, the following two additional factors must always be taken into account: (1) Age at entry; (2) weight and build. In the case of proposers under thirty-five, the risk must be treated as an increased one unless all other circumstances are unimpeachable—weight (not below good average), occupation, habits, and past history (freedom from any suspicion of tuberculous disease). If any one of these factors is unfavourable in a proposer under thirty-five, a considerable debt should be placed on the policy; if two factors—*e.g.*, weight and occupation—are unfavourable, the debt should be very heavy or the case declined altogether. In the case of older proposers, the question of weight is not so important, but I would suggest that no proposer under fifty with a tuberculous F.H. should be accepted at tabular rates if the weight is appreciably under the average for the height and age.

I would here take the opportunity of pointing out that, as the actuarial investigations show that the extra risk is essentially an early one—in the first few policy-years—an addition to the premium does not afford adequate protection to the company. The "diminishing deduction," on the other hand, forms a far better method of dealing with these cases, and, in fact, with all extra risk associated with tuberculosis, whether family history, exposure to contact infection, or a past history of the disease.

The Question of "Contact Infection."

What importance, if any, should we attach to the circumstance of a proposer living or having recently lived in association with a person or persons suffering from "open" tuberculosis?

This raises the problem as to the usual mode of tuberculous infection, incidentally referred to in the preceding section. The question was recently discussed in a very interesting manner by Dr. Batty Shaw.[1] I think I am quoting his view correctly by saying that he regards the vast majority of cases of phthisis *apparently* developing in adult life as the delayed manifestation of an infection which has occurred in infancy, and has, thanks to the resisting powers of the body, remained more or less dormant during the intervening years. According to this view, true contact infections in adult life are so exceptional as to be almost negligible, and hence, from the assurance point of view, not much importance need be attached to a proposer's living in a tuberculous environment. When one seeks for evidence for or against this theory, it is important to exclude cases of blood relation-

[1] See *British Medical Journal*, July 26, 1919.

ship, the interpretation of which would be complicated by the question of hereditary predisposition.

The most striking evidence in its favour will, I think, be found in the "Second Study of the Statistics of Pulmonary Tuberculosis: Marital Infection," by E. G. Pope, edited by Karl Pearson, and published in 1908. If "contact infection" were a frequent phenomenon, one could hardly postulate a more favourable condition for its occurrence than in the case of a healthy husband living with a phthisical wife, or *vice versa*. Yet he finds that the probability of infection between husband and wife is considerably less than between parent and child or brother and sister, a result suggesting that hereditary "lack of resistance" plays a considerably greater rôle than direct infection.

Incidentally these findings show how desirable it is to put questions of this sort to the test of actuarial investigation, as the impression made by one or two cases of marital infection coming under one's special observation is apt to be so strong as to lead one to wrong conclusions.[1]

Granted, then, that the direct infectivity of tuberculosis from person to person is comparatively small, it is going too far to assume that it is therefore, in all cases, negligible. Take, for example, an adolescent or young adult, who, on the usually accepted theory, has been infected in infancy, but whose resistance has been sufficient to defeat, or, at any rate, to render latent, this infection. If he is now repeatedly exposed to what may be termed a "mass-infection," it is reasonable to suppose that this will suffice to fan the latent infection into a new, and perhaps fatal, activity. From the practical point of view it hardly matters whether his disease is an infection *de novo* or an exacerbation of a pre-existent one—the result is equally disastrous.

Under what circumstances is this "mass-infection," this exposure to a concentrated dose of bacilli, likely to occur? By "mass-infection" I intend to convey the idea of a dose sufficiently strong to overcome the existing resistance of the body. This, of course, differs in different individuals, and in the same individual from time to time. A dose of infection that may be harmless to him when he is fit may reasonably be held to be very noxious if he is run down in health. But equally or more important is the nature of his environment when exposed to the risk. Contact in good hygienic surroundings, with adequate ventilation, is obviously far less likely to be harmful than in a close,

[1] See opinion of Wilson Fox, quoted by C. Theodore Williams in "The Infection of Consumption," *British Medical Journal*, September 21, 1909, in which the risk of marital infection is undoubtedly exaggerated. An important paper has appeared in the *Lancet*, October 4, 1919, on "Conjugal Tuberculosis," by E. Ward, Tuberculosis Officer to the County of Devon (South). From a consideration of 156 married couples, of whom one of each had been notified as phthisical, he arrives at the conclusion that marital infection is extremely common, and considers "that over 50 per cent. of all cases (of phthisis) seen are due to direct personal infection."

ill-ventilated place. The risk of "mass-infection" in a hospital or sanatorium is practically negligible, a statement confirmed by C. Theodore Williams's investigation into the histories of the medical, nursing, and lay staffs at the Brompton Hospital and Frimley Sanatorium.

In stuffy quarters, on the other hand, the risk of receiving a "mass-infection" is far greater; in this connection I should like to quote a striking example, for which I am indebted to Dr. J. D. Cochran, of Bridge of Walls, Shetland. It concerns the crew of a fishing boat—seven in number, all occupying a cabin about 14 ft. square and 6½ ft. high, with sleeping bunks arranged in the usual fashion. In May, 1909, the boat went out with a crew consisting of five local men, known to Dr. Cochran, and apparently all in good health, and two "strangers" from another part of Shetland, one of whom was suffering from "bad cough and spit." The boat remained at sea for the usual season; the subsequent history of the crew is as follows: (1) J. C., aged 18: September, 1909—returned with extensive infection of both lungs. Later the larynx became infected, and he died early in the winter. His mother had died of phthisis. (2) A. T., aged 20: history of hæmorrhage in early boyhood, but said to have been in good health ever since. Developed pleurisy early in winter 1909-10, followed by hæmoptysis and extensive disease of both lungs. Died in spring, 1910. His father had probably died of phthisis, "and a brother is affected at present" (1913). (3) J. N., aged 20. No previous history—family or personal—of tuberculosis; had hæmoptysis in winter 1909-10, followed by pleurisy, excavation of lungs, etc. Died in spring of 1911. (4) L. W., aged 45. "A big, powerful man." No family history of tuberculosis. Consulted Dr. Cochran for enlarged glands in right side of neck, *which had developed in the winter of* 1909. While waiting admission to the Edinburgh Royal Infirmary for operation, he had hæmoptysis and rapidly developed acute phthisis, which proved fatal in six weeks. (5) R. N. (master of the boat), aged 35, has left the district, but remained well as far as is known. Dr. Cochran had no first-hand knowledge of the two other members of the crew (including the one with "cough and spit"), but was told that both of these had died of lung trouble. It appears, therefore, that five men (of whom one had a bad family history, and one a bad history both family and personal), all in apparent good health in May, 1909, at that period came into close contact in a stuffy cabin with a man suffering from active phthisis. *Four out of these five men died, within the next two years, of this disease*, the first active signs in each case having appeared within a few months of contact. None of these men were closely related to each other. However great the prevalence of phthisis may be in the Shetlands, it is almost impossible to avoid regarding this as a clear example of "mass-infection"; in one of the cases (A. T.) almost certainly a

lighting up of latent disease; in one of them (J. C.) presumably an example of infection with hereditary predisposition; in the remaining two, possibly direct infection of hitherto healthy men.

My views as to the treatment of "contact cases" in connection with life-assurance proposals may be briefly summarized as follows: The points to be considered are: (*a*) Family history. (*b*) Personal history (especially with regard to tuberculosis infection). (*c*) Personal condition of proposer, including age. (*d*) Hygienic conditions under which contact occurred. If all are favourable, ignore contact. If (*a*) is unfavourable, but everything else satisfactory, ignore contact or put a small debt on the policy. The family history would, of course, be treated on its merits, as indicated in former section. If (*b*), (*c*), or (*d*) is unfavourable, defer the proposal or put a heavy debt on the policy, perhaps with an offer of reconsideration at a later date. If the proposal is unfavourable in two or more of these respects, it should be deferred or declined.

The Assurance of Individuals with a Personal History of Tuberculosis.

This subject is so wide that I can do little more than indicate my views on some of the chief points that arise for consideration. The principal types of tuberculous history met with in proposers for life assurance are: (*a*) Tuberculous Adenitis. (*b*) Tuberculosis of Bones and Joints. (*c*) Genito-Urinary Tuberculosis. (*d*) Pleurisy—Dry and with effusion. (*e*) Pulmonary Tuberculosis.

Glandular Tuberculosis.

With regard to chronic enlargement of cervical glands in childhood, it would seem that in many cases these were not tuberculous, and that, even if they were, provided they had been recovered from, with or without operation, the prospects of life were not appreciably affected if no other unfavourable circumstances existed—*e.g.*, a bad family history or poor physique.

Probably a past glandular tuberculosis does not materially add to the risk of subsequent phthisis, while the possibility of its acting as a protective agent against subsequent infection should not be overlooked.

Bone and Joint Tuberculosis.

With regard to tuberculous joints, Mr. McAdam Eccles has drawn a sharp distinction between cases in which the disease was limited to the synovial membrane, and those in which the bones, etc., were attacked. The former might recover completely, without any residual signs or symptoms, and in such a case, where there was only the history

of the disease, but no objective evidence, he would be inclined to treat it on similar lines to those gland cases in which complete recovery had occurred—*i.e.*, to overlook it provided that all other conditions were favourable and that a reasonable number of years had elapsed since the illness. If, on the other hand, there had been operative treatment, sinus formation, etc., resulting in permanent damage to the joint and other structures, he would take a much more serious view of the risk of recurrence or subsequent ill-health, and either load such cases very heavily or reject them altogether. If, however, the diseased joint had been got rid of by amputation, he regarded the risk as a lighter one, and would treat such cases on more generous lines, with only a slight load.

Actuarial figures for the results of cases accepted with a past history of glandular or articular tuberculosis are very scanty; indeed, the only ones of any interest that I could discover are some regarding a group of cases of "Tuberculosis of bones (hip, etc.)" in the American Medico-Actuarial Investigation of 1914:

	Actual Deaths.	Expected Deaths.	Ratio.
One attack within 10 years of application ...	44	23·14	190
One attack more than 10 years before application	90	73·17	120

It is important to note, however, that this investigation deals only with cases in which there was no "rating-up" on account of personal defects; in other words, we must assume that the above experience relates to cases of bone disease which were selected as first-class lives in spite of their past histories. From this point of view, the heavy mortality certainly suggests a considerable extra risk in these cases, though the actual data are rather scanty for any very definite conclusions.

Genito-Urinary Tuberculosis.

I have had to deal with a good many proposals showing a past history of this trouble, usually one of nephrectomy or of excision of a testicle for tuberculous disease. My working rule has been to defer such cases till at least five years after operation: if then there is no sign of recurrence and other factors are favourable, to recommend acceptance with a debt (lien) varying in amount with the age of proposer, etc. I should like to quote a case in which I infringed this rule by recommending acceptance within three years of operation, as all conditions seemed specially favourable.

S. W., age 22 n.b.; single; gentleman farmer. Family history: Father died of pneumonia; nil else of interest. Personal history: At end of 1909 he was thrown from a horse, and "injured his ribs." In January, 1910, a tuberculous abscess developed at site of injury: operated upon; abscess drained and soon healed. January, 1911, found

to have tuberculosis of right testicle: this was removed by the same surgeon, who made a careful examination of the base of the bladder, etc., under an anæsthetic and found no sign of extension of the disease. The operation incision healed by first intention. I examined the lad, and found him healthy-looking, living a vigorous open-air life. Height, 5ft. 9½in.; weight, 11st. 10lbs.; chest expansion, 4 inches. No sign of any disease; scars quite healthy. He was proposing for a 15 year endowment insurance, and was accepted with a 50 per cent. deduction. On October 10, 1919, I heard as follows from proposer: "I have had no recurrence of the tuberculous trouble, and as far as I know am in quite good health at the present time."

Tuberculous Pleurisy.

Assuming that the large majority of all cases of non-purulent pleurisy are tuberculous in nature, a positive history in a proposer is obviously of great importance, as pointed out by Dr. Hector Mackenzie in his paper. My usual rule is to put a debt on every case of pleurisy (not complicating frank pneumonia or other specific diseases) occurring within five years of proposal. If the attack occurred more than five years ago, I should accept at ordinary rates provided no other unfavourable factor was disclosed.

The experience of the American Investigation of 1914 on this subject is as follows (note again that all these cases were accepted at tabular rates, so far as personal history was concerned):

	Actual Deaths.	Expected Deaths.	Ratio.
A. One attack within 2 years of application	228	154·8	147
B. One attack 2 to 5 years prior to application ...	262	179·7	146
C. One attack 5 to 10 years prior to application ...	253	223·7	113
D. One attack more than 10 years prior to application	528	573·7	92

In A and B, death-rate from phthisis was about three times the normal. In C, death-rate from phthisis was about twice the normal. In D, death-rate from phthisis was about normal.

Pulmonary Tuberculosis.

The American Investigation contains an interesting group, comprising the mortality experience of cases accepted with "a history of hæmoptysis, without a distinct history of pulmonary tuberculosis."

A. One attack within 5 years of application	151	per cent. mortality
B. One attack between 5 and 10 years of application ...	131	,, ,,
C. One or more attacks, the last more than 10 years prior to application	102	,, ,,

In group A the phthisis deaths were fully five times the normal. In group B the phthisis deaths were nearly three times the normal. In group C the phthisis deaths were nearly twice the normal.

It is difficult to understand why cases with a history of comparatively recent hæmoptysis were accepted at tabular rates: the fact that the total mortality was only 151 per cent. of the expected must be taken as indicating a very careful selection as regards factors other than the history of hæmoptysis.

With regard to the future of cases of phthisis which have been under sanatorium treatment, and discharged as "arrested" or "apparently cured," the well-known analysis by Elderton and Perry (1913) of the Adirondack Cottage Sanatorium results for about 3,000 cases discharged between 1885 and 1911, showed a mortality in these classes of about twice the normal.

Quite recently (September, 1919) the Medical Research Committee has published an extremely interesting research by Dr. Noel Bardswell and Mr. J. H. R. Thomson, F.I.A., on the after-histories of 1,707 patients discharged from Midhurst Sanatorium between the years 1907 and 1914.

Mortality Experience according to Condition on Admission—i.e., whether (1) Incipient, (2) Moderately Advanced, or (3) Advanced.

The principal results from this aspect were: (*a*) The mortality was very heavy: approximately six, sixteen, and thirty-eight times the normal in the three groups just mentioned, and was relatively heavier at the younger ages at admission. (*b*) The critical period for patients, especially those in groups (1) and (2), is during the first two or three years following discharge: subsequently, the excess mortality is materially reduced: in fact, for group (1) (the incipient cases) the rates after duration, six to eight years, are not seriously above the normal.

Mortality Experience according to Condition on Discharge.

From the life-assurance point of view this is, of course, the more important analysis, as practically every proposer with a history of phthisis is one in whom the disease is supposed to be "arrested." The principal results from this aspect were: (*a*) "It is clearly demonstrated that cases classified as 'arrested,' taken as a body, experience substantially higher mortality rates than those shown by the general population." In fact, the combined ratio of actual to expected deaths in the whole group discharged as "arrested" was 4·3. Again, the average age of those "exposed to risk" in this connection was thirty-three, while their mortality rate was equivalent to that for the general population at age sixty, and in the case of the "much improved" to that at age seventy-four. (*b*) As regards the relation between mortality and the number of years elapsing since discharge, the result was as

follows: For arrested cases, the mortality is comparatively low in the early years, gradually increasing to a maximum in the fourth year, from which point it decreases, and approaches the normal in the seventh year.

Two other points of special interest from the assurance point of view are indicated in other chapters of this publication. (*a*) As regards *mode of onset*, cases commencing with a sudden hæmoptysis show rather more favourable results than those commencing with pleurisy, or "insidiously" with cough, gradual loss of weight, etc. (*b*) In the case of a person suffering from phthisis, the presence of a tuberculous F.H. does not appear to have any appreciable influence on his chance of recovery.

If it is accepted that the mortality rate in cases apparently "arrested" approaches the normal after six or seven years, then it is reasonable to assume that cases of this nature "selected" by careful medical examination may be accepted as reasonably good risks, say five years after treatment has resulted in arrest. It is my practice to recommend for acceptance, with a moderate contingent debt, cases with a history of phthisis dating back five years, who appear free from all symptoms and signs of active disease. Should the proposal be made within a period of less than five years from the date of illness, it should be deferred until the end of that period, or accepted only with a very heavy deduction, *e.g.*, 80-90 per cent., with a promise of subsequent reconsideration subject to satisfactory medical evidence.

In conclusion, it may be postulated that the problem in all cases with a history of tuberculous infection is to protect the company or society from a risk which is heavy in the first few years and then shows a rapid decrease to approximately the normal. For this class of extra risk, the contingent debt, decreasing with each year the policy remains in force, affords an almost ideal mode of treatment, and can be so graded as to render practicable the acceptance of any proposal in which there is a reasonable chance of survival during the early years of assurance.

X-RAYS IN THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS.

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Since it is safe to assert that prognosis in any case of pulmonary tuberculosis is favourable in direct proportion to the celerity with which diagnosis is made and treatment instituted one comes to the natural corollary that any method which conduces to early diagnosis is of the greatest value in reducing the ravages of this scourge. It is the belief of the writer that X-rays are valuable in this direction; not only do they assist in diagnosis in doubtful cases, but they frequently show that the stage or extent of the disease is greater than that ascertained by purely clinical examination. They can only give the maximum information when their findings are considered in conjunction with clinical evidence, and therefore should be applied only by a properly qualified radiologist who can appreciate the value of each variety of evidence and balance them against each other.

There are two methods of X-ray examination of the thorax—(1) radioscopic and (2) radiographic. In the former one uses the fluorescent screen and observes the various movements of respiration, the differences of appearance between inspiration and expiration and the gross structure. In the radiographic method one takes a series of plates and notes structural details which are not visible on the fluorescent screen. The scope of each method may be summarised by the sentence "Screen for function, plate for structure."

Now, since functional derangement frequently precedes visible structural change, it will be evident that, in many cases, we must look for the earliest manifestation of disease on the fluorescent screen. This point will become more evident as we consider the manner in which X-rays demonstrate structure. Briefly it may be said that the shadows cast upon the screen or plate by any substance through which a beam of X-rays is passing varies in depth with that of the density and thickness of the material. Thus, the screen shows the bony boundaries of the thorax as dense black shadows, the heart is almost as dense, whilst the lungs offer so little obstruction to the passage of the rays that the screen in the areas where lung only is interposed is brilliantly illuminated, and the photographic plate is correspondingly darkened—it must be remembered that shadows are dark on the screen, whilst they show as light areas on the plate. The reason why the plate shows

structure better than the screen is that it is more sensitive to small differences of shade than is the human eye, and also because it has a cumulative effect.

The lung being composed of large numbers of vesicles containing air with a network of solid tissue between the vesicles, it is evident that any process which leads to an increase in the tissue between the vesicles will cause corresponding increase in opacity, and that any increase in the air content will cause increased translucency. This is well seen in examination of the normal lung, which shows greater translucency during inspiration than during expiration. If air entry into any particular portion of a lung is restricted this difference of translucency will be diminished or abolished.

Suppose now that a tuberculous process has advanced to such a stage that actual nodules of infective material have been deposited in the lung tissue, these nodules will cast shadows on the plate or screen owing to local increase in density. If the nodules be of moderate size they will be visible on the screen; smaller ones can be seen on the photographic plate. The most striking appearance is seen when the disease is healed and the nodules calcified. This increased density then causes them to show a sharply delineated shadow, and this point is of diagnostic import in deciding whether a particular nodule is healed or active.

If a radiograph of a normal thorax be examined it will be seen that the lung roots cast definite shadows owing to the amount of solid tissue that they contain, and, radiating from these root shadows, are branching tree-like markings extending into the lung structure, becoming finer and finer as they pass towards the periphery until finally they are no longer visible. These shadows are cast by the walls of the blood-vessels and bronchi. Increased density and thickness of the shadows denote corresponding increase in the amount or density of the material casting the shadow, and it is very often difficult to decide whether the markings are in excess of the normal or not. If the shadows in one lung are evidently deeper than those in the other it is reasonable to assume that there must be some basis for this difference.

The points enumerated above are those generally accepted and used in the radio-diagnosis of pulmonary tuberculosis, but there is a stage of infection earlier than this where no gross structural change is evident, and it is highly desirable that diagnosis should be made at this stage. If there be no structural change it is evident that an X-ray plate cannot help us and therefore we must look to fluoroscopic examination for guidance.

Let us consider the mechanism of respiration. During inspiration the diaphragm descends, the ribs are raised and the sternum displaced

forwards. Movements of the vertebræ also take place. Now, we can easily observe the movements of the ribs and diaphragm on the fluoroscopic screen. The ribs are plainly seen against the light areas of the lungs. The right side of the diaphragm cannot be separated from the dense liver shadow, with which it is continuous, but the movements of the upper edge of this combined shadow are those of the right side of the diaphragm. Under the left side of the diaphragm is the fundus of the stomach. If, as is frequently the case, especially in children, the stomach contains air, the diaphragm will be seen on the screen as a thin dark band between the lighter areas of the lung above and the gas-bubble in the stomach below. If no air be contained in the stomach, the shadow of the left side of the diaphragm is continuous with the general abdominal shadow.

The importance of observing diaphragmatic movements was realised early, and a paper giving measurements of several cases appears in the *Lancet*, June 27, 1903, from the pen of Dr. Halls Dally, who notes the diminished movements of this muscle. In the experience of the present writer there is a stage even earlier than that of actual limitation, this stage can best be described as hesitation, and it is his belief that this is, so far as our present knowledge goes, the earliest sign of infection. Doubtless this sign was not discovered by Halls Dally owing to the limitations of the apparatus which he used. The interrupter must be running perfectly smoothly to see the sign as any trace of flicker on the screen renders it invisible.

In a typical case it will be seen that the diaphragm on the affected side commences its descent a fraction of a second later than on the sound side. Frequently it descends in a series of jerks instead of in an even sweep, but has the same range of movement as on the healthy side. Later in the course of the disease there may be actual limitation of the range of movement.

Concurrently with the change in diaphragmatic function there may or may not be limitation of costal movement on the affected side; in either case the effect is to diminish air entry into the diseased lung. If air entry be greatly diminished it will show on the screen as a failure to light up during inspiration, but it may be diminished to a degree which is not perceptible with our present fluorescent screen. The actual limitation, however, can always be seen when present, and it implies diminished air entry. There is not space here for discussion of the reason for interference with diaphragmatic function, but it is at all events possible that it is nature's effort to give rest to the infected lung.

It is noteworthy that in many cases this diaphragmatic limitation does not persist when organic change in the lung is demonstrable. Cases are frequently seen in which gross lesions are evident, yet the

diaphragmatic excursion is normal, other methods for dealing with the invading bacilli having been elaborated by the system. It must not be forgotten that there are two avenues by which the bacilli can reach the lung—by inhalation and by the blood or lymph stream. If inhaled the bacilli would alight immediately on the lining membrane of the alveoli or smaller air passages; if carried by the blood or lymph stream, one might reasonably expect the interstitial tissues to be the first involved, and the reaction of the system may vary according to which avenue the bacilli take. If air-borne, a primary alveolitis might be the first reaction and be early detected clinically, but if interstitial, then considerable change could take place before clinical signs were evident.

Now let us make an attempt to correlate clinical and radiographic evidence in the very early stages, with particular reference to the significance of impaired percussion note. It is usual to consider percussion downwards, as one might express it, from the normal to the abnormal, but we will think of it upwards from the abnormal to the normal. For this purpose imagine a collapsed lung which is connected with an air-pump. Percussion of such a lung would give an absolutely dull note (thinking of the lung alone, and not as contained in the cavity of the thorax), and radiographic examination would disclose a very dense shadow. If air now be pumped into the lung and frequent examinations be made at intervals, both by percussion and X-rays, it would be found that the percussion note would become gradually more resonant and, *pari passu*, the shadow seen on the X-ray plate or screen would become lighter. There is, therefore, a definite relation between the air-content of the lung on the one hand and the percussion resonance and radio-transparency on the other. If we push the process of pumping to excess we shall eventually reach a stage where the air vesicles are over-distended; in other words, a condition of emphysema. We should now expect to have a lung tympanitic to percussion and hyper-translucent to X-rays: these are exactly the conditions which we do find in emphysema. Thus, we see that both impaired percussion-note and diminished radio-transparency may result from diminished air-content without macroscopic structural change. If gross structural change be present in addition, percussion dulness and radio-opacity will be correspondingly increased, but with this difference—that the opacity to X-rays and the dulness to percussion are present during both inspiration and expiration if due to structural change, but if due to diminished air entry alone the phenomena can only be observed during inspiration.

If it be remembered that air entry into the lung is dependent on diaphragmatic and costal movements, it will be evident that any diminution in these movements will give rise on the fluorescent screen

to diminution of the *difference* in illumination between inspiration and expiration, and on percussion to the *difference* in the notes obtained during these two phases of respiration. That this is a fact has been observed on many occasions by the writer, and it has been demonstrated to Halls Dally, who was responsible for the clinical data.

It must be remembered that diaphragmatic limitation may be caused by pleural and abdominal as well as by pulmonary conditions, and these must be excluded in order to arrive at a correct diagnosis. The fact remains that impaired percussion note on inspiration has been found in cases which show no detectable organic change, but do show functional derangement of the diaphragm.

The writer is quite aware of aspects from which this theory can be assailed, and invites criticism of what is but a tentative explanation and an attempt to assist in early diagnosis. Much might be written on the appearance when visible organic changes have developed, but space forbids.

REFORMATION IN SANATORIUM MANAGEMENT.

By G. B. ROATTA,

M.D.,

Recently Medical Superintendent of the Military Sanatorium at Gorgonzola and Viggiu.

When the Great War broke out, sanatorium treatment was very much in the same position as when the first sanatorium made its appearance in Europe in the middle of last century. Our ideas regarding, and knowledge of, tuberculosis and what has to be understood by its "cure" are now altogether quite different. Tuberculosis in bygone days was considered an illness to be cured; now it is being viewed as a disease to be prevented. But prevention has to be understood in quite a special way when we come to deal with tuberculosis. Tuberculosis is a very different infectious disease from scarlet fever, measles, and other so-called zymotic fevers.

We now know that it is practically impossible to prevent a civilized man from coming in contact with the germs of tuberculosis. Nearly everybody has to fight his battle against the common enemy. The tuberculous patient is one who has temporarily failed in his combat. He has to be taught how to keep in check the infection, how to live on good terms with it, and, possibly, how to overcome it. Nobody knows

when the battle is definitely won. Nowadays we do not say a patient is cured, but that he is clinically an arrested case.

If we see more tuberculosis cases now than formerly, we can congratulate ourselves that the most severe forms of tuberculosis are getting rarer. "Galloping" consumption is but rarely met with. The attitude of medical men towards tuberculosis and sanatorium treatment, generally speaking, does not follow the extension of our knowledge. Like a certain lord who, at the end of a long political career, used to say of the many speeches he had listened to that, while some had changed his opinion, none had ever altered his vote, the sanatorium routine for most medical advisers remains still what it was some fifty years ago. Many causes are responsible for this conservatism. The more important have perhaps arisen from the prevalence of inadequate accommodation. The most pitiful and advanced cases—that is to say, the least suitable for sanatorium treatment—have nearly always been present in too great numbers in sanatorium institutions. According to their needs, treatment and sanatorium routine have been standardized. The early cases, which are always increasing in numbers with the increase of our knowledge regarding the management of tuberculosis, generally cannot find place in sanatoria. The patients, indeed, often refuse to enter institutions which are supposed to be, or at any rate call themselves, centres "for the treatment of consumption."

Another fault of the sanatorium for working classes is its derivation from the sanatorium for the well-to-do. This was the first class of sanatorium to be established. Rich people, when they come to a sanatorium, are generally in a somewhat advanced stage. In many places it is the custom to amuse such patients at health resorts and watering-places as long as possible. When they leave the sanatorium, they return to their health resorts and watering-places to continue the nursing of their health. The workman, however, has to return to his hard work and to his poor surroundings.

A gap exists between sanatorium life and normal life. This accounts for perhaps two-thirds of the so-called failures in sanatorium treatment. The other third must certainly be accounted to the sanatorium itself. When a man is discharged from a sanatorium as "cured," that means only that he is cured so far as sanatorium life is concerned. This restricted and safeguarded life is too special to authorize any extension of this judgment to the ordinary life. But is a special, idle life necessary to the treatment? Certainly not. For a man accustomed to hard work, poor surroundings, badly chosen food, the healthy regular life of a sanatorium is so great a change that he very seldom needs more elaborate treatment.

During the war I had the privilege of superintending the most badly equipped sanatorium in Europe. It had no climatic advantages;

there were no open-air shelters; we had no nurses; there existed nothing but a barrack-like building with a little flat ground and a few ignorant soldiers to help me. At the beginning I felt quite at a loss, and I thought under the circumstances little else could be done but to treat symptoms and lighten the conditions of the patients. I tried to start a circulating library, but it did not take me long to find out that, for a man brought up to do manual work, only the activity of his muscles can change his ideas and bring a healthy activity into his brain; so I looked elsewhere for means of recreation. I thanked everyone who sent books, but greatly astonished my friends in Italy by asking for tools. Manual work, started for mere recreation, proved very useful in many ways. Men liked it, then became cheerful, self-confident, and the great majority showed themselves capable of really useful work, not only without physical damage, but with marked improvement of their health bodily and psychical.

The institution lost little by little its hospital appearance and assumed that of a busy home, with the exception of one ward that I kept on as the infirmary. Fortunately I had very little ground at my disposal: this prevented me from entering on systematic agricultural work.

Agricultural occupation owes its privileged hygienic reputation, not to the actual work itself, which often requires a very unhealthy attitude and too strenuous efforts; but to the healthy surroundings in which it is carried out. If you make shoes in the open air, you will find shoe-making as healthy as growing cabbages.

I always encouraged my patients to continue their former occupation as far as their health allowed and the primitive conditions of the hospital equipment and personal assistance would permit. I thought the way in which the work was done was more important than the choice of work. We must not as a rule take away a tuberculous patient from his usual occupation, but enable him to do it under better conditions. He must be taught to make a better use of his working capacity, and to alternate rest and work according to his individual needs. This experience has been too handicapped in many ways by the special war conditions in which it has been done, but all the same it was enough to convince me of the great advantage of the system if carried out under skilful direction and assistance.

Till some twenty years ago we kept delicate children away from school to lead an idle and demoralizing life; now we send them to open-air schools, with the greatest benefit to their health and character. The same advantages we can expect for the reformed sanatorium, which will not be any longer a hospital, but a home, a training-school for a normal useful life.

THE NEXT STAGE IN THE TUBERCULOSIS MOVEMENT: A CRITICISM AND A SUGGESTION.

By W. M. CROFTON,

M.D.,

Visiting Physician to the Royal National Hospital for Consumption, Ireland; Lecturer in Special Pathology in University College, Dublin; Author of "Pulmonary Tuberculosis: its Diagnosis, Prevention, and Treatment."

I was much interested in the symposium on the Next Step in the Tuberculosis Movement which appeared in a recent issue of this journal, containing various views by well-known authorities. I must admit being disappointed at the lack of originality. As far as I can see, there were no suggestions made of methods that have not already been applied sufficiently thoroughly in certain places, such, for example, as Edinburgh and Belfast, and have failed to reduce the death-rate from tuberculous disease.

Of course, the general mechanism of dealing with the patient from his home through suitable institutions and back again must be perfected and extended throughout the whole country; but perfect machinery is useless without motive force, and the present machinery for dealing with tuberculosis is of little use, because the methods of prevention and treatment which we already have available are only imperfectly applied.

The tuberculosis specialist calls on the general practitioner for early diagnosis. The general practitioner retorts: "Give me a method of early diagnosis, and I will apply it." The expert is silent, because he cannot make a positive diagnosis until tubercle bacilli appear in the sputum. And yet, I know, a method of diagnosis is ready to our hands—viz., the subcutaneous injection of a reliable tubercle antigen. The occurrence of a general reaction after such agent means, with but few exceptions, active tuberculous disease. If there is a reaction in a suspected focus the diagnosis is absolute. The antigen I use in my practice is benzoyl chloride solution, which is perfectly reliable and harmless in the doses prescribed—viz., 0·0000001 mg., 0·000001 mg., 0·00001 mg., 0·0001 mg. It is uncommon not to get a reaction after the second dose if the disease is active. I hold that it is peculiarly important to use this method on contacts—*e.g.*, members of a family in which a case of tuberculous disease has occurred—for these members of tuberculous families have a low resistance to the disease, and have had special facilities for acquiring a virulent infection. Those who do not react will, I venture to believe, have had their resistance to the disease increased. The method has every advantage. I am convinced that the case incidence and

mortality of the tuberculous disease will not be decreased until this method is universally applied. Further, the cases so diagnosed are in the early stages of the disease and in those without sputum, indicating an unmixed infection; a proper course of tuberculin will by itself bring about cure without difficulty. Even without such a test, cases of hæmorrhage, however slight, or pleurisy must be assumed to have the disease, and should at once receive a course of tuberculin.

Turning now to the treatment of cases of pulmonary tuberculosis with sputum and tubercle bacilli in the sputum. I have good reason for asserting that, for all practical purposes, such cases are all suffering from a mixed infection with tubercle bacilli and catarrh-producing microbes. If the latter are not efficiently dealt with in the method of treatment employed, treatment is bound to fail. This, I hold, is the cause of the failure of tuberculin in the treatment of the disease. Complete autogenous antigens are essential for effective treatment. Further, intravital germicides, such as iodoform in ether or di-iodosalicylic acid, given intravenously, are of immense help. I expect to be able to advocate others in the near future. Let me quote the immediate results obtained in the National Hospital for Consumption in Ireland. I take the year 1914, when the iodoform-catarrh antigen-tuberculin method came largely into use, and compare it with the results obtained in 1912, when the ordinary sanatorium method prevailed:

Year.[1]	Percentage of Apparently Cured Cases.		
	First Stage.	Second Stage.	Third Stage.
1912	10·9 per cent.	6·6 per cent.	0 per cent.
1914	35·7 „	21·6 „	5·6 „

All these cases had tubercle bacilli in their sputa before treatment, and were not pronounced "apparently cured" until they were free after three or more examinations.

Of course, everyone will agree with Sir Clifford Allbutt that prevention is everything; but I cannot agree that isolation alone will cut off the source of infection. The only effective way known to science of preventing such a universal infection is the increasing of the individual's resistance by prophylactic inoculation.

[1] The figures for 1918 are 50 per cent., 16·6 per cent., and 1·6 per cent. respectively.

SOME GENERAL IMPRESSIONS OF THE CONFERENCE OF THE NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS, OCTOBER, 1919.

By J. DUDGEON GILES,
O.B.E., M.D., CH.B.,
Medical Superintendent of the Hope Hospital of the Salford Union, Manchester.

Having had the privilege of attending as a delegate the meetings of the Conference of the National Association for the Prevention of Tuberculosis, I have attempted to state in the following paper some quite general impressions gleaned at that Conference of the present position of the campaign aganist tuberculosis.

What was a very interesting feature of the proceedings was the presence of speakers of note from the United States, France, and Belgium. (Italian delegates were also expected, but were unable to attend.) The speakers emphasized one great gain that has sprung from co-operation in war of the Allied Nations—namely, the necessity for consultation and mutual assistance in devising and executing plans for waging a campaign upon disease, both in armies and among civil populations. Several speakers gave outlines of the methods of organization evolved for combating tuberculosis in France, America, and Belgium. It was gratifying to learn that in the first instance the schemes in these countries were largely modelled on plans already adopted in Britain. This close collaboration brought about by war needs, the patient working out of plans suited to the various countries, and the exchange of ideas between experts in all branches of this preventive campaign, have undoubtedly made it clearer than ever that the conflict against tuberculosis must be envisaged from an international point of view. One conception that became very forcibly impressed on one as a result of the Conference was that this campaign, directed particularly against tuberculosis, is a prototype of all struggles between preventive medicine in the widest sense, and infective diseases in general. As a type of disease affecting society in all its branches, tuberculosis stands as the great example. The ramifications of its effects among all classes of the community, and in every aspect of human activity, are so extensive that it may be said to deserve to be considered at present as the most deadly enemy of mankind, the extermination of which would bring about the most signally beneficial results. And this, not merely because, by the extermination of tuberculosis, one great cause of death and disablement would have been

removed; but because, concurrently with the process of elimination of this disease, there would automatically and inevitably have been brought about a great lessening of the effects of many, if not of all, of the diseases caused by infective agents. In considering the question of diseases caused by bacteria, the thing that at once comes into one's mind as of the very highest importance is what is known as the resistance or resisting power of the individual against the attacks of the infective agent. This resistance is partly determined by the inheritance by the individual of healthy tissues from his ancestors, immediate and more remote. The resisting power of the individual (good or bad, as inherited) is, however, affected very powerfully by his environment from birth to death. It is with the individual's environment that the efforts of any campaign against tuberculosis are mainly concerned. Its efforts are directed towards improving this environment. The environment of the individual includes the kind of house he lives in, the clothes he wears, the food he eats. Also the conditions under which he works, and—what is apt to be forgotten—the conditions under which he spends his leisure hours. In addition to all this must be considered the personal equation—the habits of the individual. This last is a delicate question to tackle, but it is surely justifiable to anticipate that improvement of the environment of the individual will tend to improve his personal habits, and that education, specially directed towards making him familiar with common-sense hygiene, will render obedience to the teachings of this science an habitual and an instinctive thing. Thus are brought under the purview of the reformer such questions as the housing of the people, the conditions under which they work in factory, works, office, or in the streets or fields. Also the question of wages, food supply, and the preparation of food in the home, and the conditions under which men, women, and children spend their leisure within or outside of the home.

The present existing sources of infection received pronounced consideration. The patient suffering from tuberculosis is giving out and passing to others the bacillus which is the cause of the disease. This aspect of the subject involves the question of the treatment of the existing cases of the disease, and the methods of the institutional and domiciliary management of the sufferers from tuberculosis—methods which must accommodate themselves to the various classes of cases—namely, surgical and medical, and of the latter, early cases and those progressing in various stages, and those advanced and of more or less chronic character. Here come in the questions of sanatoria, domiciliary treatment, dispensary accommodation for the treatment of active cases, and for the repeated routine examination and observation of contacts; and the suitable provision for convalescents still infective, but able to do some work, and who, many of them, need special training to enable

them to undertake, on recovery, employments more suitable for subjects of a disease which is so liable to recur. Lastly, provision must be made for patients who have arrived at the chronic stage of the disease, with copious sputum, though probably less actively infectious than the earlier cases. At the present stage, methods of dealing with the classes of cases just mentioned must be carried on along with the preventive methods which aim at improving the environment of the whole population. Thus the present problem includes the treatment, and, where practicable, the isolation, of cases of all kinds, and the concurrent improving of housing, working, and general sanitary conditions.

In addition to these preventive activities great stress was laid on the usefulness, and indeed the necessity, of education in simple elementary physiology and hygiene, of all classes of society and from an early age. This educational campaign, which has apparently been carried out with greater thoroughness in the United States of America than elsewhere, aims at producing among the general population a widespread sort of hygienic conscience, based on the scientific facts relating to methods of infection and how to avoid it.

The Conference was also engaged in a consideration of the higher and more detailed education necessary for those who are to undertake the actual carrying out of the campaign against tuberculosis. I mean the doctors, nurses, and lay men and women who intend to devote their energies as tuberculosis medical officers, tuberculosis nurses, and health visitors. The view was expressed that with regard to doctors, more facilities should be provided for young doctors who are aiming at being tuberculosis medical officers, having advanced and special instruction in tuberculosis in all its aspects, and in the special diagnosis and the practical application of the most modern methods of preventing tuberculosis and of treating the disease. It was extremely interesting to have as one of the chairmen, and to hear him express his mature views, Sir Robert W. Philip, who has recently been appointed as the first Professor of Tuberculosis, as a special subject, in Edinburgh University —the first such appointment to be made in any country; showing, however, an example certain to be followed before long in many Universities and Medical Schools all over the world.

In view of what has already been said, it will be obvious that tuberculosis, the effects of which ramify through every part of the social fabric, requires specialized teaching by means of a series of lectures and courses of practical work which cover all aspects of the disease, and thus give a unified view of the whole subject. During the present medical curriculum the student receives instruction in tuberculosis in a very piecemeal fashion—as it is partly dealt with in Systematic Medicine, partly in Surgery, under Diseases of the Skin, among Diseases of Children, in Public Health, and in Pathology. The value

of a unified course, covering the whole subject under one Professor, is obvious. The doctor-in-making will be trained into a wide view of the whole subject of tuberculosis, and will be a more valuable unit in the army of extermination to be engaged in the conquest of this scourge.

The position and influence of trained nurses were discussed. Here I would interpolate my own opinion that the only satisfactory groundwork for the training of a tuberculosis nurse—as of any nurse devoting herself to a special branch of her profession—is a thorough all-round general training such as is given in the large Hospital and Infirmary Training Schools, only with this proviso—that the general training of all nurses should include (as it generally does) a short course in elementary hygiene, sanitation, and preventive medicine.

Lastly, the tuberculosis campaign requires health visitors, apart from the tuberculosis nurses proper. And while such posts might be held, and properly so, by fully-trained nurses, there is no doubt that this work of home visiting, advising as to home sanitary conditions, food, clothing, and personal hygiene, could be perfectly well undertaken by lay men and women who have undergone courses of training in hygiene and sanitation only, and practical work under the Health Department of a large town. These lay visitors would save the employment of fully trained nurses, whose services will be needed for actual nursing; and in the more responsible Public Health posts, where a nursing training is essential.

A very hopeful feature of the proceedings at the Conference was the announcement of the recent decision of the various Red Cross Societies to throw in their lot with, and to add their practical assistance to, the efforts of the National Association for the Prevention of Tuberculosis. The Chairman of the B.R.C.S., Sir A. Stanley, presided at one of the sessions of the Conference, and emphasized this point in his speech. If the hopes of the organizers are realized, this step will bring into the battle-front a huge and efficient organization with all the recent successes of war-time efforts behind it, and with a great number of trained organizers and V.A.D.'s, from whose ranks it should be possible to enlist a very large number of men and women already partly trained for this special work, and eminently suited for the positions of health visitors.

It became apparent during the discussions that beyond and apart from the difficulties inherent in the nature of the disease itself, and the administrative difficulties of dealing with the environment of the population in general, there is a great barrier to the progress of the campaign in the ignorance and lethargy of the majority of all classes of the community. Already the schemes for dealing with tuberculosis are in most localities and countries almost complete. But if these schemes are not worked conscientiously in every detail, by everyone, from the central

administrators at the Health Ministry, down to the humblest employee under a local Health Authority, then the campaign will fail of its purpose, and will lag and be comparatively useless. So that in the long run, the most important measure is the education in health matters of the whole population from the lowest to the highest. In this way a sound public opinion on health matters will be formed, and the work of the campaign will proceed smoothly and efficiently. This educated public health or hygienic conscience in the population, directed by the research and administration of the best experts of this country and of the world, will undoubtedly eventually exterminate the white plague, and this will bring in its train the diminution of many of the ills to which our human flesh is heir.

THE CITY OF LIVERPOOL SANATORIUM FOR TUBERCULOSIS AT FAZAKERLEY.

By VINCENT HOOPER,
A.R.I.B.A.,
Architect of the Fazakerley Sanatorium.

The sanatorium which the City of Liverpool has built at Fazakerley, a suburb about five miles from the centre of Liverpool, is situated on a site to the south of the City Hospital. The position is elevated and falls gently southward to a small stream, beyond which are pleasant tracts of farming land.

Before the inception of the scheme to build a sanatorium on this site, a portion of the adjoining hospital had been used for the treatment of cases of tuberculosis on sanatorium lines and with good results.

The accommodation provided is arranged in seven principal blocks, administrative with dining-hall, dining-rooms, kitchen, stores, and larders, and a portion set aside for housing the female domestic staff. The medical block has consulting and lecture rooms, laboratory, and dispensary; and on its west front there are residential rooms for the medical staff. A home has been built for nurses.

The three chief blocks for patients are in line to the south of the administrative blocks and stand on the edge of the sloping portion of the field. By this means they command the finest views and catch the cleanest air, and are away from the busier roads and the entrance to the institution. The three blocks consist of one, to the west, for the male ambulant patients, and a similar building for women on the east, with a central nursing block for both sexes. The twenty-five beds for children are situated in a similar one-story building some distance

away from the quarters for the adult patients, and in the most secluded corner of the site.

The entrance roadway is arranged through a winding avenue of trees from the lane some distance to the west of the site, and is commanded by the lodge, in which accommodation will be provided for the porters. From this point the effect of the buildings and the wide grass lawns and flower-beds will be that of a large open quadrangle, with the medical block in front and the nurses' home and men's pavilion respectively to the left and right.

On approaching the medical block, the drive branches on the one hand to the left and northwards for administrative services; and on the other hand, southward and eastward between the administrative and patients' blocks. In the original design, the space so formed was

FIG. I.—THE FAZAKERLEY SANATORIUM: THE DINING-HALL.

quadrangular, but though some of this spirit has been lost in a more recent rearrangement of plans, a pleasant and sheltered garden will be formed here, bounded on the north by the long line of the dining-hall, and southwards by the rear of the hospital. This latter building consists of four wards for eight, eighteen for two, and eight for one bed apiece, or seventy-six beds in all; and has three duty-rooms, a service-room, four lavatories, and six bathrooms.

The men's pavilion is on simpler lines, it being assumed that patients will generally be convalescent. This has four wards for twelve and sixteen for two beds apiece, or eighty in all, with two duty-rooms, four lavatories, and eight bathrooms. The women's pavilion is in all respects similar to the men's, but with four wards for eight instead of twelve, and therefore accommodating sixty-four patients.

The children's block has twenty-five beds in four, two, and one bedrooms, mostly divided by glass windows, and in the centre by the duty-room—boys on the one hand and girls on the other.

All wards have some one or more pairs of doors opening to exterior verandas or paved spaces; most of these have sufficient cover to permit of sleeping out in fine weather. This is all arranged without the least loss of sunshine in the wards.

In the administration block all the storage, cooking, and service of food is centralized, whilst in the medical block the more detailed medical examinations can be carried on in perfect quiet, and be coupled with research and lectures to medical and patient classes.

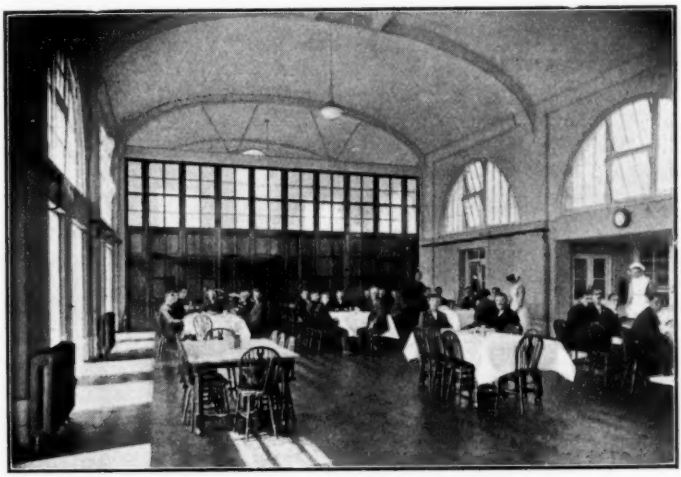


FIG. 2.—THE FAZAKERLEY SANATORIUM: THE INTERIOR OF THE DINING-HALL.

The buildings are faced with brick, in places relieved with terra-cotta dressings and portions of white cement stucco, and have grey slated roofs.

The windows are of one pattern, a pair of side-hung sashes below a pivot-hung fanlight. Doors to veranda and open pavings conform to this idea, being cut on the lock rail, so that the upper portions can be open, if necessary, with the lower portions closed.

From the first the idea of erecting temporary buildings was not favoured, climatic conditions such as those of Liverpool necessitating a building capable of being more or less protected against the severest weather. It was felt that, however admirable the open veranda type of sanatorium is for some districts, it was advisable in this case to provide

buildings capable of being closed. The arrangement and type of windows adopted, however, will admit of the best possible ventilation, and there is no reason why the air of the wards should ever become vitiated.

There is a central plant for domestic hot water, and also a certain amount of low-pressure hot-water heating, more for airing the wards than heating them. For the runs of the necessary pipes an ample system of subways has been formed to connect the blocks with the boiler-house.

Sputum is disposed of by steam destruction in a special room near

FIG. 3.—THE FAZAKERLEY SANATORIUM: NURSING HOME BLOCK.

the boiler-house, and adjoining it there is already both a disinfector and a destructor, forming a kind of disinfecting centre away from the main buildings.

The total accommodation in permanent buildings as now built is 245, but extension with châlets will be an easy matter, as the permanent buildings comprise sanitary and administrative accommodation for a greater number.

The site around the buildings is being laid out as grass and flower-gardens, with shrubberies and trees, to get protection against searching winds.

ASSOCIATIONS AND INSTITUTIONS.

NORTH-WESTERN TUBERCULOSIS SOCIETY.

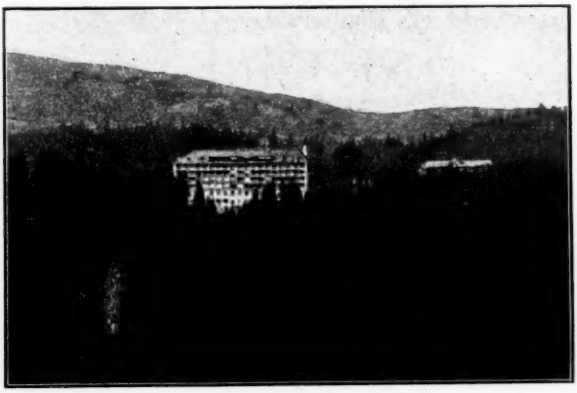
THE aims of this newly constituted body are to provide adequate means for the study and discussion of all subjects relating to the prevention and treatment of tuberculosis. It is believed that there is need for such a society, which will enable medical men interested in tuberculosis and working in the North-Western Counties to meet together at frequent intervals at some readily accessible centre. Some of the present members are also members of the Society of Medical Officers of Health and the Tuberculosis Society. The new Society is at present quite independent, and its future policy must depend upon the considered judgment of the full and representative membership which is anticipated. The subscription is not yet fixed, but will be small. Membership is open to any medical practitioner interested in tuberculosis. The Hon. Secretary is Dr. George Jessel, County Tuberculosis Dispensary, 13, Church Street, Leigh, Lancs.

THE TRUDEAU SCHOOL OF TUBERCULOSIS.

SOME years before the death of the late Dr. Edward L. Trudeau suggestions were made to him that he should initiate a course of teaching in connection with the Trudeau Sanatorium and Laboratory, which should provide post-graduate instruction for physicians who had not had facilities for obtaining systematic instruction regarding the early diagnosis of tuberculosis or been able to secure an opportunity for the study of laboratory methods directly useful in the recognition and treatment of tuberculosis. Nothing came of these preliminary consultations until the year before he died, when a gift was made by a friend to inaugurate a three-years' special post-graduate course. Four sessions have been held since 1915, with an attendance ranging from ten to twenty-five physicians, and during the months of June and July, 1919, the fifth session was held, with a larger number of students than ever before. The course offers combined clinical and laboratory exercises, special emphasis being placed on physical signs, differential diagnosis, and the interpretation of X-ray examinations. The laboratory course includes instruction in the bacteriology and pathology of tuberculosis, carried to a degree which will give students an intimate knowledge of sputum examination, culture of the tubercle bacillus from the sputum, inoculation of animals, and other methods and measures now considered essential in the conduct of the investigation of tuberculous cases. Especial attention is given to laryngeal tuberculosis and other complications of pulmonary tuberculosis. The facilities of the Trudeau Sanatorium, New York State Sanatorium, at Ray Brook, near by, and the Stony Wold Institution, where only women and children are received, are all used for demonstrations. There are, besides, two

hospitals for advanced cases which are utilized for clinics. The beautiful mountain and lake environment, and ease of access of these institutions from the centre of Saranac Lake, make the sojourn a very attractive one for physicians who can get away to the mountains during June and July, which time of the year has been found most desirable for holding the sessions. The class is limited to twenty, so that emphasis can be laid by personal instruction to each student, enabling each to become proficient in recognizing physical signs. A considerable number of the students who have thus far attended the courses have themselves been victims of tuberculosis, and with the disease now in an arrested condition have prepared themselves to make this speciality their life-work. The favourable reception which the course has thus far received justifies the belief that it will make for greater efficiency in the diagnosis and treatment of the disease in general practice. In future sessions it is hoped that students may visit the Trudeau School from Britain. Full particulars may be obtained from the Director, Dr. Edward R. Baldwin, at Saranac Lake, N.Y., U.S.A.

THE SANATORIUM ALTEIN-AROSA.



SANATORIUM ALTEIN-AROSA.

THE new sanatorium "Altein," at Arosa, in the Grisons, Switzerland, is now available for British visitors. It is an establishment for the treatment of pulmonary tuberculosis and surgical tuberculosis. Dr. O. Amrein is the Medical Superintendent. An illustrated and descriptive booklet will be sent to any English doctor on application.

NOTICES OF BOOKS.

ARTIFICIAL PNEUMOTHORAX IN PULMONARY TUBERCULOSIS.

COMPRESSION therapy in pulmonary tuberculosis has now an extensive literature. Professor Morelli, in his two-volume monograph on artificial pneumothorax and allied methods of treating pulmonary tuberculosis, has provided a most comprehensive review of the work of the past two decades.[1] Short as this period is, it has seen a complete revolution in the treatment of advanced cases, the prognosis of which has been profoundly affected by the work of Forlanini, Saugman, and others. The advanced case is no longer necessarily synonymous with the hopeless case, and the physician of to-day is far better equipped in his struggle to prevent the early stage passing into the advanced stage than he was only a few years ago. The path of progress has been paved, or let us rather say profligately littered, by countless publications, a few good, but most indifferent. Professor Morelli has undertaken the Augean task of sorting this miscellaneous collection, and his thirty-page bibliography is a measure of his labours in this direction. On the whole, he proves himself an admirable clearing-house, and though in places there is more evidence of studious compilation than of discriminating selection, he has undoubtedly succeeded in reducing his raw materials to digestible dimensions. The first volume deals with the historical side, with the physiology of the chest, technique, complications, and after-care. The effect of treatment on the various organs is discussed, even the changes observed in the functions of the renal and nervous systems coming under review. One chapter is alone devoted to the chest signs in artificial pneumothorax; another exclusively to pleural adhesions, which the author finds are most deplorably often responsible for failures. In his discussion of the part played by the sounder of the two lungs, when its fellow is temporarily put out of action, he shows the wide knowledge that can afford to admit its limitations. Even the apparently sound lung may give way when doing the work of two, whereas in other cases, as his detailed accounts show, a serious lesion in the sounder lung does not prevent dramatically successful results. In the second volume comparatively rare complications are discussed, as well as the vexed questions of sudden death from various causes. The results of the treatment are analyzed, and an attempt is made to measure success by statistics, though the author admits the potential mendacity of statistical analyses. This volume also deals with other forms of compression therapy, Tuffier's and Freund's teachings are reviewed, and the operations of Mane, Murphy, Jessen, Seidel, Kausch, Bircher, and others are described. It is impossible to peruse this book without coming to the mortifying conclu-

[1] "Pneumotorax Artificial y otras Intervenciones en la Tuberculosis Pulmonar: Estudio Critico y Clinico." Pol el Doctor Juan B. Morelli, Professor de Clinica Terapeutica de la Facultad de Medicina. Vol. I., pp. 664; Vol. II., pp. 665-1247. Plancha VII. Montevideo: Imprenta Nacional. 1919.

sion that Anglo-Saxon contributions to the promotion of compression therapy are comparatively insignificant. Were it not that an admirable textbook (Rivière's) is already available to the English reader, Professor Morelli's book would be well worth translating.

X-RAYS AND PLEURO-PULMONARY DISEASE.

We have no hesitation in saying that hospital, dispensary, sanatorium, and other centres for the clinical investigation of chest cases should be provided with facilities for systematic examination by X-rays. The advantages of the assistance of radio-diagnosis in the elucidation of pleuro-pulmonary affections are fully demonstrated in Dr. Barjon's able monograph, of which a version in English has been provided by Dr. J. A. Honey.[1] This timely and most practical book sets forth in detailed and lucid manner the scope of Roentgenological diagnosis. A perusal of these pages and a study of the numerous radiographs will convince the most conservative clinician that the physician engaged in tuberculosis work must co-operate with the radiologist. The methods of examination are first explained, and then follow consideration of the application of radiology in the investigation of affections of the pleuræ, bronchi, and lungs. A special section is devoted to a discussion of the study of penetrating wounds of the thorax by war projectiles. An excellent chapter is devoted to the examination of cases of pulmonary tuberculosis, and a number of instructive radiographs are given. We strongly urge all tuberculosis officers and others engaged in the study and treatment of chest cases to make a point of reading this notable monograph.

INFECTION AND IMMUNITY.

In the study of the prevention and arrest of tuberculosis and all other germ diseases, it is essential that students of the subject and all investigators should have clear conceptions regarding the nature of infection and immunity, and present-day methods which seek to influence these conditions. Dr. C. F. Bolduan and Mr. J. Koopman are the authors of a particularly helpful manual, which in its latest and fifth edition provides a remarkably concise and yet complete exposition of the main facts as yet established regarding infection and immunity.[2] The first edition was issued in 1904, and through the years the work has undergone constant revision, and now is recognized as both reliable and up to date. After a general introduction there follow

[1] "Radio-Diagnosis of Pleuro-Pulmonary Affections." By F. Barjon. Translated by James A. Honey, M.D., Assistant Professor of Medicine in Charge of Radiography, Yale Medical School. Pp. xix+183, with 36 figures and numerous radiographs. New Haven: Yale University Press, 120, College Street. London: Mr. Humphrey Milford, Oxford University Press, Amen Corner, E.C. 4. 1918. Price 10s. 6d. net, or $2.50.

[2] "Immune Sera: A Concise Exposition of our Present Knowledge of Infection and Immunity." By Charles Frederick Bolduan, M.D., Director of Bureau of Public Health Education, Department of Health, City of New York; and John Koopman, B.S., Bacteriologist, Serological Laboratory, Department of Health, City of New York. Fifth edition, thoroughly revised. Pp. viii+206. New York: John Wiley and Sons, Inc. London: Chapman and Hall, 11, Henrietta Street, Covent Garden, W.C. 2. 1917. Price 7s. net.

chapters dealing with Antitoxins, Agglutinins, Bacteriolysins and Hæmolysins, Precipitins, Cytotoxins, and Opsonins. There is also a separate chapter on Snake Venoms and their Antisera. The question of anaphylaxis receives special consideration, and there are sections on Bacterial Vaccines and Leucocyte Extracts in the Treatment of Infections. It should also be noted that the Wassermann Reaction is considered, and a detailed account given regarding the conduct of the test. The work deals with questions new to most medical practitioners, and provides in concentrated and yet convenient form just the information which many require to enable them to keep in touch with modern methods of inquiry and present-day diagnostic and therapeutic procedures. The work is appropriately dedicated to Dr. Hermann M. Biggs, the founder of the first municipal serum laboratory in the world.

PROBLEMS OF HOUSING AND HUMAN ENVIRONMENT.

In the last issue of this journal it was clearly shown that tuberculosis was in great measure a problem of housing. It has become evident to all that until there is adequate provision of hygienic homes the prevention and arrest of tuberculosis cannot be attained. Every student of the tuberculosis problem must of necessity take a real interest in all matters relating to housing. A suggestive and instructive handbook on the economic planning and construction of cottages and small houses has been issued by Mr. Gordon Allen, and is now in its sixth edition.[1] It is thoroughly practical, dealing with questions of site, plan, design of exterior, construction of interiors, materials, sanitation, lighting, water supply, and prices. There is also serviceable information regarding building by-laws. The volume is artistically got up, and is provided with an excellent collection of plans and illustrations of modern houses, including specimens of those erected recently in Crayford Garden Village, Chepstow, Gretna, Woolwich, and elsewhere. The manual is one which throws much light on the most pressing problem of the times.

Dr. Dubash, an Indian philosopher and sanitarian, has recently issued a novel little book on town planning and vegetation, for which Sir John Cockburn has written a sympathetic introduction.[2] The author has sought to provide students with a concise, suggestive, and serviceable manual on the principles and practice of house planning for community life. It is full of directing data, information, and helpful guidance. The most original part is that which deals with the influence of vegetation, the chromatic aspect of plantations and gardens, and the use of shrubs and trees in the construction of a hygienic town. The work is one which deserves the serious study of all interested in the development of new towns, garden cities, and æsthetic and hygienic homes.

[1] "The Cheap Cottage and Small House: A Manual of Economical Building." By Gordon Allen, Architect, late Royal Engineers, F.R.I.B.A. Sixth edition, revised and enlarged. Pp. xii+144, with 107 plans and illustrations. London: B. T. Batsford, Ltd., 94, High Holborn, W.C. 1. 1919. Price 8s. 6d. net.

[2] "Hygiene of Town Planning and Vegetation." By P. S. G. Dubash, D.Sc., Vice-President of the International College of Chromatics. With an Introduction by the Hon. Sir John Cockburn, K.C.M.G., M.D. Pp. 127. London: G. Bell and Sons, Ltd., York House, Portugal Street. W.C. 1. 1919. Price 3s. net.

Reference may here be made to a particularly valuable reference work on "Forests, Woods, and Trees in Relation to Hygiene," by Professor Augustine Henry.[1] It is based on three Chadwick Public Lectures delivered at the Royal Society of Arts in London in May, 1917. The work describes the influence of forests on climatic and sanitary conditions, discusses the rôle of parks and trees in municipal life, and advocates afforestation of pit mounds and water catchment areas in various districts of the British Isles. A special section is devoted to the consideration of forests as sites for sanatoria, and interesting particulars are given of the forestry work undertaken at the Hairmyres Colony in Lanarkshire. Professor Henry's monograph is one which tuberculosis officers will do well to study, especially those who are likely to be responsible for the development of new colonies for tuberculous subjects.

Dr. John C. Thresh, the Consulting Medical Officer of Health for the County of Essex, has written a remarkably outspoken and able pamphlet on Housing and the Agricultural Labourer.[2] This informing, suggestive, and critical contribution appears at an opportune time, and merits the unprejudiced study of all concerned for the better housing of the rural worker.

The Ministry of Health have recently issued the first volume of a manual on unfit houses and unhealthy areas.[3] It provides a general statement of the law in reference to such dwellings and districts, and indicates the policy to be adopted. The work is intended primarily for the guidance of officials and members of Local Authorities, and it should certainly be studied by all tuberculosis officers. Plans are provided of tenement dwellings, and illustrations are given showing how clearance and replanning of slum areas may be carried out.

The Housing Department of the Ministry of Health now issue every fortnight a journal bearing the title of *Housing*.[4] A number of other official publications have recently been issued by the Ministry of Health bearing on the Housing Problem, and all deserve the serious study of those dealing with tuberculosis.[5]

A circular has also been issued relative to the use of huts in connection with schemes for the treatment of tuberculosis.

The Mansion House Council on Health and Housing have published

[1] "Forests, Woods, and Trees in Relation to Hygiene." By Augustine Henry, M.A., F.L.S., M.R.I.A., Professor of Forestry, Royal College of Science, Dublin. Pp. xii+314, with 50 maps and illustrations. London: Constable and Co., Ltd., 10, Orange Street, Leicester Square, W.C. 1. 1919. Price 18s. net.

[2] "Housing of the Agricultural Labourer, with Special Reference to the County of Essex." By John C. Thresh, M.D., D.Sc., D.P.H., Consulting Medical Officer for the County of Essex. Pp. 81. Printed by John Dutton, 8, Tindal Street, Chelmsford, and published by the Rural Housing and Sanitation Association, Adelphi, W C. 2. 1919. Price 6d. net.

[3] "Ministry of Health: Manual on Unfit Houses and Unhealthy Areas." Vol. I.: "Policy and Practice." Pp. 32, with plans and appendices. London: H.M. Stationery Office, Imperial House, Kingsway, W.C. 2. 1919. Price 1s. net.

[4] *Housing* is issued by the Housing Department of the Ministry of Health, fortnightly, "for official use." Price 3d. net each number.

[5] See General Housing Memoranda issued from time to time; "Housing by Public Utility Societies" (price 1d.); "Manual on the Preparation of State-Aided Housing Schemes" (price 2s. 6d. net); "Manual on the Conversion of Houses into Flats for the Working Classes" (price 1s. net); "Housing: New Methods of Construction" (price 1d.). These and all other official publications relating to housing and the Housing Acts can be obtained from H.M. Stationery Office.

a Report on the Housing Problem in London, with plans showing how large dwellings may be divided into flats.[1]

Some of the "Guides to Smallholders," issued by the Board of Agriculture and Fisheries, will be found of practical service by those responsible for the conduct of tuberculosis colonies and the guidance of arrested cases engaged in open-air occupations.[2]

MANUALS FOR MEDICAL ADVISERS AND WORKS OF REFERENCE.

Mr. Herbert Tilley's fine treatise on "Diseases of the Nose and Throat" is now in its fourth edition.[3] The work is one which should be in the possession of every tuberculosis officer, medical superintendent of a sanatorium, and all who are called to advise in regard to naso-pharyngo-laryngeal cases. The book has been thoroughly revised, considerably enlarged, and effectively brought up to date. It should be noted that the volume is one of a practical series intended to meet the needs of senior students and progressive practitioners. It will also be appreciated by experts. The author has wisely based his teaching mainly on personal experience. Considerable space is devoted to tuberculous lesions. The section on tuberculosis of the larynx is excellent and serviceably illustrated. It is claimed that "sanatorium treatment alone, combined with absolute rest of the vocal organs—the so-called 'silent treatment'—has sufficed to cure many cases of laryngeal tuberculosis without active local measures of any kind." The descriptions of practical methods of treatment will prove helpful in the management of this particularly distressing form of tuberculosis. There is an excellent collection of valuable formulæ. The volume is admirably got up, well printed on good paper, lavishly illustrated, conveniently arranged for reference, and there is a good index. Mr. Tilley's treatise is undoubtedly the best work available on the diagnosis and management of affections of the nose and throat.

Dr. Pottenger is well known to many readers of this journal as a particularly able exponent of the problems of tuberculosis, and an experienced clinician in the diagnosis and management of tuberculous disease. In his latest work he has entered on a task of exceptional complexity and profound difficulty.[4] He seeks to interpret in terms of visceral neurology

[1] "The Housing Problem in the Metropolis: Conversion of Large Houses into Flats; Report by the Mansion House Council on Health and Housing." Published by Technical Journals, Ltd., 27-29 Tothill Street, Westminster, S.W. 1. Price 1s. net.

[2] "Guides to Smallholders." Prepared by the Board of Agriculture and Fisheries, and primarily issued for the information of Service men intending to settle on the land. Price 2d. each, post free. A list of the "Guides" and other publications can be obtained on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, S.W. 1, and letters need not be stamped.

[3] "Diseases of the Nose and Throat." By Herbert Tilley, B.S., F.R.C.S. Fourth edition. Pp. xx+844, with 74 plates and 266 figures. London: H. K. Lewis and Co., Ltd., 136, Gower Street, and 24, Gower Place, W.C. 1. 1919. Price 25s. net.

[4] "Symptoms of Visceral Disease: A Study of the Vegetative Nervous System in its Relationship to Clinical Medicine." By Francis Marion Pottenger, A.M., M.D., LL.D., F.R.C.P., Medical Director Pottenger Sanatorium for Diseases of the Lungs and Throat, Mourovia, California; Professor of Diseases of the Chest, College of Physicians and Surgeons, Medical Department, University of Southern California, Los Angeles, California. Pp. 328, with 86 text illustrations and 9 coloured plates. London: Henry Kimpton, 263, High Holborn, W.C. 1. 1919. Price 21s. net.

symptoms which are met with in the ordinary investigation of visceral disease, and he approaches his subject not so much from the standpoint of the disease process as that of the patient. In his highly original monograph he endeavours to indicate how pathological changes in one organ affect other organs and influence the whole organism, and this through the medium of the visceral nerves. This remarkable book deserves to rank alongside of Sir James Mackenzie's "Symptoms and their Interpretation." We earnestly commend the study of Dr. Pottenger's notable volume to all physicians, and particularly those who have an opportunity in sanatoria and elsewhere of watching cases of tuberculosis and investigating them, not merely as specialists, but as philosophic students of clinical medicine. The monograph is divided into three parts, dealing respectively with the Relationship between the Vegetative Nervous System and the Symptoms of Visceral Diseases; Innervation of Important Viscera, with a Clinical Study of the More Common Viscerogenic Reflexes; and the Vegetative Nervous System. The work is a masterly exposition of a preliminary excursion into a comparatively new field. It is for young explorers to take up the survey. The systematic study of Dr. Pottenger's suggestive volume will go far to develop some of the most essential characteristics of the scientific clinician. The book is excellently illustrated.

Heliotherapy has proved of much service in the treatment of tuberculosis, especially for children, and when carried out in suitably placed and well-conducted open-air schools. Drs. Armand-Delille and Wapler have issued an informing brochure on the subject.[1] Tuberculosis officers and school medical officers will do well to consult this suggestive booklet. The numerous illustrations are especially interesting and instructive.

An interesting brochure on condensed milk has been written by Dr P. Lassablière. After describing the history of its introduction and methods of preparation, it deals in detail with the value both in health and in the management of various derangements of condensed milk. There is a section on "Suralimentation Lactée chez les Tuberculeux."[2]

Dr. F. Rees, of Wigan, has issued a suggestive brochure on reconstruction schemes relating to problems of social medicine and measures for the maintenance of public health. The work deserves the study of all interested in the questions connected with National Health Insurance and State Medical Service.[3]

The volumes of the "English Public Health Series," edited by Sir Malcolm Morris, are providing welfare workers and those interested

[1] "L'École de Plein Air et l'École au Soleil." Par MM. P. Armand-Delille, Médecin des Hôpitaux de Paris, et Ph. Wapler, Médecin du Dispensaire Antituberculeux de Versailles. Avec une Préface de M. le Docteur H. Méry, Professeur Agrégé de Médecine de Paris, Président de la Ligue d'Hygiène Scolaire. Ouvrage publié par le Comité National d'Education Physique et d'Hygiène Sociale, 1, Rue Taitbout, Paris; avec le Concours du Comité Franco-Américain des Enfants Rapatriés des Regions Envahies, Évian, Hte. Savoie. Pp. 30, with 18 plates. Paris: A. Maloine et Fils, 27, Rue de l'École de Médecine. 1919. Price 4 fr.

[2] "Le Lait Condensé." Par le Dr. P. Lassablière, Chef de Laboratoire à la Faculté de Médecine de Paris. Pp. iii+109. Paris: A. Maloine et Fils, 27, Rue de l'École de Médecine. 1919. Price 3.50 fr.

[3] "National Health: From Magic Mystery and Medicine to a National Health Service." By Ferdinand Rees, M.D., Hon. Physician, Royal Albert Edward Infirmary, Wigan. Pp. 68. Bristol: John Wright and Sons, Ltd. 1919. Price 2s. 6d. net.

in the development of practical measures for human betterment with up-to-date information and reliable guidance. The last volume of the series to be issued is an excellent manual by Dr. Joseph Cates on the school-child.[1] Reference is made to the occurrence of tuberculosis in childhood. There is a good chapter on the cripple-child, in which the question of surgical tuberculosis receives consideration.

Medical practitioners, nurses, and other health workers called to duties in France or among French-speaking patients should know of the excellent little manual of "First Lessons in Spoken French" issued by the University of Chicago Press.[2] It consists of a collection of thirty-six "Lessons," with useful lists of words in frequent use among doctors and nurses.

Health visitors to Scarborough and district should procure a copy of the new 1919 edition of the "Handy" Guide to Scarborough and Coast prepared by Mr. Ernest E. Taylor. It provides up-to-date information, is well illustrated, and contains a good map of the Yorkshire coast extending from Hull to Redcar.[3]

We desire to welcome and to commend to our readers *The Journal of Industrial Hygiene*.[4] It is a publication which tuberculosis officers and other medicals interested in social medicine should make a point of reading. In addition to valuable and wisely selected original articles, each number is provided with an extensive abstract of the literature of industrial hygiene, which in itself makes this periodical indispensable to those who desire to keep up to date.

A revised list of sanatoria for tuberculous cases has recently been issued by the Ministry of Health.[5]

The well-known firm of Abdulla and Co., Ltd., has issued an attractive form of calendar, which will be particularly suitable for sanatoria, hospitals, and other institutions.[6]

[1] "The Welfare of the School-Child." By Joseph Cates, M.D., B.S., D.P.H., Medical Officer of Health and School Medical Officer for St. Helens. Pp. xi+154, with 6 illustrations. London: Cassell and Co., Ltd. 1919. Price 5s. net.

[2] "First Lessons in Spoken French for Doctors and Nurses." By Ernest H. Wilkins, Algernon Coleman, and Ethel Preston. Pp. viii+137. Illinois, U.S.A.: The University of Chicago Press. 1917.

[3] "The 'Handy' Guide Series: Scarborough and Coast Guide." By Ernest E. Taylor. Second edition. Pp. 79, with illustrations and map. Darlington: *Northern Echo* Printing Works, Priestgate. 1919. Price 6d. net.

[4] *The Journal of Industrial Hygiene* is edited in U.S.A. by Dr. David L. Edsall; in Great Britain by Dr. A. F. Stanley Kent. Dr. Thomas M. Legge is the Hon. Consulting Editor. The editorial office in U.S.A. is at 240, Longwood Avenue, Boston, Mass., U.S.A., and in this country the Department of Industrial Administration, College of Technology, Manchester. The publishers are Macmillan and Co., Ltd., St. Martin Street, W.C. 2. The annual subscription for this country is 21s. net. Single copies, 3s. net.

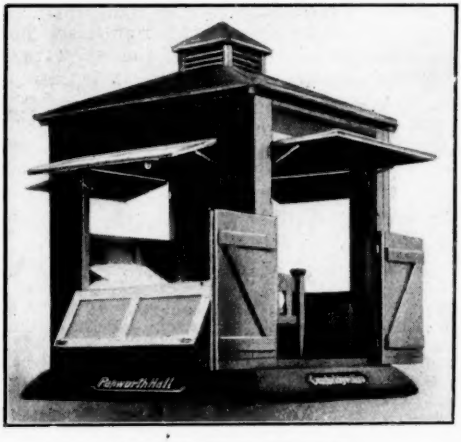
[5] "List of Sanatoria and other Residential Institutions approved by the Ministry of Health under the National Insurance Act, 1911, for the Treatment of Persons suffering from Tuberculosis, and Resident in England and Wales, with the Names of the Administrative Counties and County Boroughs in which the Institutions are situated, and the Date on which the Approval expires in Each Case." Pp. 15. London: H.M. Stationery Office. 1919. Price 3d. net.

[6] A copy of the Abdulla Calendar can be obtained on application to Abdulla and Co., Ltd., 173, New Bond Street, W. 1.

PREPARATIONS AND APPLIANCES.

THE PAPWORTH SHELTER.

At Papworth Hall, the Cambridgeshire Tuberculosis Colony, founded and conducted by Dr. P. C. Varrier-Jones, there is now an industrial centre where old patients are engaged in serviceable constructive work. Here is made the Papworth Shelter after the model employed in the Colony.[1] This shelter has been designed and constructed under the personal supervision of Dr. P. C. Varrier-Jones. The Papworth Shelter admirably meets the requirements of tuberculous patients undergoing open-air treatment. The shelter is of convenient size, 7 ft. by 7 ft. 4 ins., and being constructed in sections can be easily moved and erected where desired without skilled assistance. Each shelter is fitted with a wardrobe and adjustable table. Double shutters are fitted on two sides and at the back. There are also double doors with shutters above. These shutters are adjustable and fitted with casement stays. There is a louverd roof to allow of roof ventilation. The structure is absolutely rain and weather proof. The boarded roof is covered with three-ply Rubberoid, and the floor is constructed of tongued and grooved boarding, while the sides, back, and front, are of morticed and tenoned framing and jointed match-boarding. The shutters are framed at angles and hung with T joints, and covered with double canvas. The doors are ledged and braced, hung with T joints and fitted with bolts and dead lock. All the shelters are treated with creosote before leaving the works. It will be seen from this brief description that the Papworth Shelter meets all requirements for a reliable and comfortable structure for the hygienic management of tuberculous cases and other patients requiring open-air care. The price of each shelter is £25.

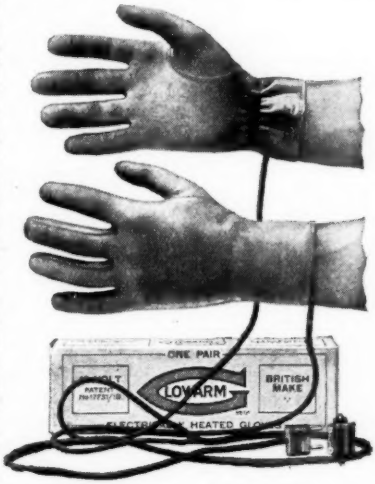


THE PAPWORTH SHELTER.

[1] Full particulars regarding supply of the Papworth Shelters to sanatoria and elsewhere may be obtained on application to the Director, Papworth Industries, Papworth, Cambridgeshire.

ELECTRICALLY HEATED GLOVES.

Electrically heated gloves have recently been introduced and should prove a boon to doctors and others who in wintry weather have to undertake motor journeys. We think this ingenious and comfort-bringing contrivance might be adapted to meet the needs of patients undergoing open-air treatment. The GLOWARM ELECTRICALLY HEATED GLOVES are certainly a novelty.[1] Their general form is indicated in the accompanying figure. They are provided with a flexible cable and a neat two-pin plug and socket which can be readily connected with the switchboard, junction box, or conducted direct to the battery terminals. These gloves certainly add greatly to the delights of motoring in cold weather. The gloves are designed for use in connection with Dyamo Lighting Systems, and there should be no difficulty in bringing them into use for patients in modern sanatoria. The gloves are made of a strong grey fabric and are comfortable to wear and pleasing to look at. They are to be worn within a usual form of glove or gauntlet.



THE GLOWARM ELECTRICALLY HEATED GLOVES.

THERAPEUTIC, HYGIENIC, SANITARY, AND COSMETIC PREPARATIONS.

At this season of the year chilblains are a source of much discomfort to many patients undergoing open-air treatment. Numberless agents have been advocated as of service in the prevention and arrest of pernio. AMBRINE, a convenient form of paraffin preparation extensively used in the treatment of scalds and burns, has been recommended and seems to merit a thorough trial.[2] CALCIUM LACTATE has also been advised as a useful medicament for internal administration in erythema pernio and certain other cutaneous affections and hæmic derangements. The "tabloid" form is the most convenient means for general use.[3]

CALCIUM IODO-RICINOLEATE has been recommended as an agent of value in the treatment of tuberculosis and certain other diseases of the

[1] Full particulars regarding the Glowarm Electrically Heated Gloves for use with 12 and 6 volt batteries can be obtained from the makers, The Electrotherm Co., Manchester Buildings, Upper Priory, Birmingham.

[2] Ambrine is supplied by the Anglo-French Drug Co., Ltd., 238a, Gray's Inn Road, W.C. 1, from whom full particulars can be obtained.

[3] Messrs. Burroughs Wellcome and Co., Snow Hill Buildings, supply a "Tabloid" Brand of Calcium Lactate, each containing 5 grms. A leaflet giving particulars regarding its use can be obtained on application.

lungs and cardio-vascular system. It contains a large proportion of iodine in organic combination. It is well tolerated, and seems to be indicated as a desirable preparation when a long-continued administration of iodides is required.[1]

GLYCO-HEROIN, now known in this country as "Glykeron," is a preparation which has been well tested, and is generally approved. It is said to contain heroin, henbane, ammonia hypophosphate, balsam of Tolu, and white pine bark. It is a powerful analgesic, and is particularly useful in ameliorating the useless cough which is often so distressing in pulmonary tuberculosis and certain inflammatory states of the respiratory passages.[2]

EUCAFORM is a compound of eucalyptol and formalin with certain essential oils. It forms a useful inhalant for the treatment of catarrhal and other morbid states involving the respiratory passages. It can be sprinkled on a handkerchief and inhaled, or used in connection with one of the well-known forms of oro-nasal inhalers.[3]

Drugs come and drugs go, but in spite of all changes of fashion and opinion there is no wavering in the belief in the efficacy of COD LIVER-OIL and MALT PREPARATIONS in the management of states characterized by wasting and general malnutrition. In tuberculosis these agents are certainly often of the greatest service. The Maltine Preparations supplied by the Maltine Manufacturing Company are thoroughly reliable. They are available in various forms. The Maltine can be obtained in combination with cod liver-oil, iron, phosphates, hypophosphates, creasote, pepsin, and pancreatin, cascara sagrada, and also with phosphorus, iron, quinine, and strychnine. A particularly excellent preparation is Malto-Yerbine. In all these the Maltine is of the best quality, containing 75 per cent. of diffusible cereal proteids, carbohydrates, and organic phosphates. The preparations have powerful starch-dissolving power, and are nutrients of real worth. They are particularly palatable, and children take them eagerly.[4] The Maltine Manufacturing Company issue every year an admirable form of diary likely to be of special service for the recording of engagements in connection with the work of sanatoria and tuberculosis dispensaries and the like. A copy will be supplied to any medical practitioner on application.

The comfort of patients and those whose duty it is to render them assistance can be much increased by a discriminating use of reliable COSMETIC PREPARATIONS and APPLIANCES[5] suitable for the maintenance of personal hygiene. We would direct the attention of medical advisers and nurses to the elegant and scientifically prepared appliances provided by the well-known firm of Dubarry et Cie. Among the many specialities now available for use in this country we would recommend the tablets of "COMPRESSED BATH SALTS." These render the bath

[1] Messrs. Burroughs Wellcome and Co. provide a "Tabloid" Brand Capsule of Calcium Iodo-Ricinoleate, and this forms one of the best means for the regulated and systematic use of the drug. Each capsule contains 3 grms.

[2] Full particulars regarding "Glyco-Heroin" or "Glykeron" can be obtained from Messrs. Thomas Christy and Co., 4, 10, and 12, Old Swan Lane, Upper Thames Street, E.C. 4.

[3] "Eucaform" is supplied by Messrs. Strickland and Co., 23, Cromwell Place, South Kensington, S.W. 7.

[4] Particulars regarding all the varieties of Maltine preparations can be obtained from the Maltine Manufacturing Co., Ltd., 183, Acton Vale, W. 3.

[5] Particulars regarding the specialities manufactured by Dubarry et Cie. may be obtained on application to their London house at 81, Brompton Road, S.W. 1.

water not only soft and delightfully perfumed, but exercise also an invigorating and tonic action on the body generally and a beneficial influence on the skin. The "SANOS MOUTH-WASH TABLETS" contain thymol, menthol, and other antiseptics, and provide a portable, convenient, and effective means for the ready and rapid preparation of an oral wash or gargle. The "GLYNTOS TOOTH PASTE" is a dainty dentifrice free from all fermentable or other deleterious constituents. "MENTHOLCLONE" is an excellent local application for use in headache and neuralgic conditions. It consists of a solidified eau-de-Cologne, incorporating menthol. This pocket companion will be of the greatest service to many sufferers.

Cosmetic preparations, if wisely selected and judiciously used, are capable of doing much for the comfort, health, and general well-being of patients undergoing sanatorium treatment, or persons living the open-air life. Messrs. D. and W. Gibbs have recently favoured us with specimens of their specialities. We would particularly direct attention to the excellent "Cold Cream Soap." This is a superfatted preparation, free from any excess of soda and potash, and admirable for the subjects of delicate skins. Another refreshing and antiseptic cleansing application is provided in the "Kura Soap," an ideal preparation for toilet use and employment in the bath and nursery. Gibbs's "French Dentifrice" is another dainty means for the maintenance of oral hygiene. Patients in hospitals and sanatoria will also appreciate the superfatted "Cold Cream Shaving Soap" in stick form.[1]

PREPARATIONS AND APPLIANCES FOR THE DOCTOR OR THE PATIENT.

An artistic, useful, inexpensive, and dainty little domestic hand-lamp has been introduced under the designation of the "TWEENY-LITE," and is likely to find favour not only in ordinary private houses, but in institutions providing for the needs of invalids and sick folk. It is said that when in use the outlay for sixty hours is only one half-penny. The general appearance is indicated in the accompanying figure, and the lamps may be obtained coloured in art shades. A small quantity of paraffin is poured into the saucer rim, and is absorbed into the asbestos packing within the cone.[2]

THE TWEENY-LITE.

"PRESERVO" is an inexpensive and reliable medium for preserving fruit in ordinary bottles or in jam-jars.[3] It is not a chemical preservative, but provides a new form of sealing process which is said to be safe and sure. Many sanatoria possess their own gardens, orchards, and fruit fields, and will doubtless be glad to put "Preservo" to a thorough trial next summer.

The FORD BOAT in one form or another of its different models is likely to be a much appreciated addition to the equipment of any

[1] The Gibbs Cosmetic and Personal Hygiene Preparations are manufactured by D. and W. Gibbs, City Soap Works, London, E.

[2] The "Tweeny-lite" costs 6½d., and may be obtained from the British Home Utilities Company, Ltd, Britannia House, Cross Street, Farringdon Road, E.C. 1.

[3] A "Preservo" outfit, sufficient for the sealing of thirty ordinary jam-jars, costs 1s. 9d. Full particulars may be obtained from the makers, Elliott and Co., Paddock Hall Road, Haywards Heath, Sussex.

sanatorium situated on a river or having a lake at hand. Many an open-air vagabond who is able to fix his habitation according to his own sweet will will rejoice at the prospects of adventure made possible by this novel, portable, folding, inexpensive, and manageable boat.[1]

In the treatment and conservation of consumptive cases the regulating of exercise and rest under open-air conditions is of fundamental importance. But many cases, even when the disease is arrested, are seriously handicapped in their physical powers. The wise "lunger" realizes his limitations, and adjusts himself to his handicap. Some patients are enabled to make use of a low-geared bicycle, while others are so fortunately situated as to be able to have the use of a suitable motor-car. Our attention has recently been directed to the A.B.C. SKOOTAMOTA,[2] which seems to have promise of valuable service for certain classes of handicapped patients. It would seem likely to be helpful to some patients who are the subject of

THE SKOOTAMOTA.

old lung trouble, or who have enfeebled cardiac powers. This new invention provides for motoring in its simplest form. We shall be glad to have the experience of any of our readers who have tested the new motor-scooter.

PEAT AS FUEL.

During the winter the question of fuel will be a very important matter for sanatoria. There are many institutions where peat may be used with advantage. In Scotland and Ireland and other countries peat is used extensively, and with a little common sense brought to bear on the adjustment of fireplaces peat might well be employed in many homes and institutions in this country. For those desirous of trying the experiment we commend the peat blocks provided by Messrs. J. B. Wilson and Son.[3]

[1] Full particulars regarding the Ford Boats can be obtained from the Ford Boat Trading Corporation, North Audley House, Grosvenor Square, W. 1. (Prices from £3 5s. to £18 10s.)

[2] Particulars regarding the A.B.C. Skootamota may be obtained from Messrs. Greenly's, Ltd., 37 to 38, Strand, W.C. 2. The development of the machine is in the hands of Gilbert Campling, Ltd., 1, Albemarle Street, W. 1.

[3] Messrs. J. B. Wilson and Son, Peat and Agricultural Merchants, 1 and 2, Facade, West Norwood, S.E. 27, will supply 1,000 blocks of peat for £5 5s., delivered in London.

THE OUTLOOK.

THE TUBERCULOSIS PROBLEM.

TUBERCULOSIS is a world-wide menace to human health and happiness. War and its concomitants and consequences have not only hindered the campaign against tuberculosis, but have led to an appalling increase in the prevalence of the disease in the war-stricken countries of Europe. During the war the tuberculosis movement in this country has been seriously affected, and we are now faced with large numbers of necessitous tuberculous men and women and children for whom the provision available is quite inadequate. We have repeatedly urged the need for a thoroughly representative Government inquiry to consider the tuberculosis question in all its medico-sociological bearings. A complete and authoritative statement of the present position of the problem is urgently required. The Ministry of Health should lose no time in arranging for a Royal Commission, an Inter-departmental Committee of Investigation, or some really representative body to consider all aspects of the tuberculosis problem as they appear under after-war conditions. The existing situation and available machinery are described in the recently issued "Forty-eighth Annual Report of the Local Government Board."[1] "The number of beds provided by local authorities in sanatoria and hospitals has increased from 1,500 in 1911 to 7,038 on March 31, 1919, and the number of dispensaries provided by such authorities from 30 to 349 during the same period. Considerable extension of the sanatorium accommodation provided by voluntary bodies has also been effected, and it may be noted that, notwithstanding the restrictions on capital expenditure and the difficult labour conditions during the war, the accommodation in sanatoria and hospitals belonging to local authorities and voluntary bodies has been increased from under 5,700 beds in January, 1912, to 8,888 beds in August, 1914, and to 13,523 beds at the end of March, 1919. In addition, four large sanatoria, containing in all 650 beds, will shortly be available. Two of these have recently been completed, and the other two have been in use as military hospitals. . . . In most areas it has been found impracticable during the war either to maintain the efficiency of existing work, or to carry out extensions. . . . Many thousands of soldiers and sailors have been discharged from the services suffering from tuberculosis and requiring treatment in residential institutions." There is reason to believe that there has been a considerable increase of active tuberculosis among the civil population. Certainly there has been a very definite rise in the death-rate from tuberculous disease. The fact is we are still lacking in reliable knowledge regarding the pathology of tuberculosis, and our means for recognizing the disease in its beginnings are inadequate. It

[1] "Forty-eighth Annual Report of the Local Government Board, 1918-1919." Part I.: Public Health, Local Administration, Local Taxation and Valuation. Part II.: Housing and Town Planning. Part. III.: Administration of the Poor Law, Old Age Pensions. Part. IV.: Special Work arising out of the War. Pp. 197. London: H.M. Stationery Office, Imperial House, Kingsway, W.C. 2. 1919. Price 1s. net. [Cd. 413.]

is well to admit also that the instruction at present provided for the training of medical advisers and practitioners capable of dealing adequately with tuberculosis in its many forms is still very imperfect. Encouragement may be found in the announcement that schemes for research work are to be developed.[1] We live and move and have our being in war's aftermath, and if progress is to be made in the campaign against tuberculosis we must be willing to secure readjustment and reconstruction in our methods of conflict.

THE TUBERCULOSIS COLONY.

War with its terrible wastage of men has forced into prominence the claims of the tuberculosis colony as a desirable means for dealing with some of the discharged, disabled soldiers afflicted with tuberculosis. Dr. Chapman's Memorandum (reviewed in July, 1919, issue of this journal) has fully presented the case regarding the place of the colony as a training and employment centre, as viewed from the British standpoint. We have recently received a careful study, "The Agricultural and Industrial Community for Arrested Cases of Tuberculosis and their Families," which sets forth the situation as seen in America.[2] The question has been investigated in all its bearing by a representative advisory committee appointed by the National Tuberculosis Association, and in the foreword of the bulletin it is announced that "criticisms, opinions, or suggestions will be very much appreciated, and should be sent to the National Tuberculosis Association, 381, Fourth Avenue, New York City, or to the Federal Board for Vocational Education, Washington, D.C." The Report, if such it can be called, is issued under the name of Dr. H. A. Pattison. It is there stated that, "the evidence is overwhelming that the campaign against tuberculosis has not yet developed adequate plans and facilities for the post-sanatorium treatment of patients. It is being more and more clearly established that it is the environment of the sanatorium graduate and his method of spending his time after working hours that most frequently determine his fate rather than the work itself." The growth of the "colony" idea is described, and the essentials for the conduct of a successful community are dealt with in detail. The bulletin contains valuable extracts from reports, books, and periodicals, including a number of extracts from past numbers of this journal, bearing on the subject. There are also records of a discussion held by tuberculosis specialists and patients, and the conclusions of an investigation regarding the probable maximum amount required as subsistence aid during one year for a given number of tuberculous persons and their families.

THE KING'S SANATORIUM.

The King Edward VII. Sanatorium was opened on June 13, 1906. The Twelfth Annual Report, dealing with the year July, 1917, to July, 1918, has recently been issued. It is of exceptional interest, in

[1] "Fifth Annual Report of the Medical Research Committee, 1918-1919." Pp. 90. London: H.M. Stationery Office. 1919. Price 6d. net. [Cd. 412.]

[2] "The Agricultural and Industrial Community for Arrested Cases of Tuberculosis and their Families." A Study issued as Bulletin No. 32 in the Re-education Series, No. 6, and published by the Federal Board for Vocational Education, Washington.

that it affords a more or less continuous statistical record of cases that have been under observation and treatment. From the first the Turban-Gerhardt method of classification was adopted. This system of grouping, although of some interest and service, is now to a great extent discredited; indeed, in some of the best of the modern manuals dealing with pulmonary tuberculosis no reference is made to it. The Midhurst Report reproduces the following description as it appeared in the official Journal of the International Tuberculosis Committee, and as it may be of service for reference we reproduce it here: "I. Disease of slight severity, limited to small areas of one lobe on either side, which, in the case of infection of both apices, does not extend beyond the spine of the scapula or the clavicle, or, in the case of affection of the apex of one lung, does not extend below the second rib in front. II. Disease of slight severity, more extensive than Group I., but affecting, at most, the whole of one lobe, or severe disease extending at most to the half of one lobe. III. All cases of greater severity than Group II., and all those with considerable cavities. By disease of slight severity is to be understood: disseminated foci characterized by slight dulness, indefinite, rough, or weak vesicular, vesico-bronchial, or broncho-vesicular breathing, and fine and medium crepitations. By severe disease: massive infiltration recognized by definite dulness, broncho-vesicular or bronchial breathing, with or without crepitations. Cases with signs of considerable excavation, giving rise to tympanitic percussion with amphoric or cavernous breathing, and numerous coarse consonating crepitations, come under Group III. Pleuritic dulness, if only of slight extent, is to be left out of account; if it is considerable, pleuritis should be specially mentioned under tuberculous complications. The following terms are used to describe the condition of patients on discharge from the Sanatorium: *Disease arrested:* General health completely restored in every respect, without any sign of disease of the lungs except such as is compatible with a completely healed lesion. Sputum, if still present, free from tubercle bacilli. *Much improved:* General health good. Physical signs of disease in the lungs, though much diminished, not entirely cleared up—*e.g.*, perhaps limited to a few crepitations on cough only. Tubercle bacilli still to be detected in the sputum. *Improved:* General health improved, but not restored. Physical signs of disease in the lungs, though less marked than on admission, still present. *Stationary:* No appreciable improvement in the condition of the lungs or in the general health. *Worse:* General or local condition worse.

RESULTS OF TREATMENT AS SHOWN BY THE CONDITION OF THE PATIENTS ON DISCHARGE FROM THE KING'S SANATORIUM.

	Number of Cases.	Disease Arrested.	Much Improved.	Improved.	Stationary or Worse.	Died in Sanatorium.
Group I.	66	44	17	3	2	—
„ II.	146	24	83	23	15	1
„ III.	92	1	41	22	26	2
All cases	304	69	141	48	43	3

Group IV.: Patients in whom no definite evidence of pulmonary tuberculosis was found.

Number of Cases.	Much Improved	Improved.	Stationary or Worse.
8	6	2	—

The Report upon the statistics of the Midhurst cases has been prepared by Dr. Noel D. Bardswell, the late Medical Superintendent. The Medical Research Committee (National Health Insurance) have voted an annual grant for the furtherance of the statistical researches of the Sanatorium. The data relating to every patient discharged since the opening of the Institution have been arranged on a card index system, planned so as to facilitate any kind of statistical inquiry. Of 2,540 patients discharged from the Sanatorium since 1906, information up to the present time has been ascertained in all but 50 cases—a loss of only 1·9 per cent. of the total number of patients discharged. Of patients who are or have been on active service, 35 have relapsed and been invalided from the service; 75 patients have, as yet, maintained their health under active service conditions. Many of these patients have served for several years. The total number of former patients who have served with His Majesty's forces, excluding those in whom no definite evidence of pulmonary tuberculosis was found, is 126: 56 have served in France, 7 in Salonica, 1 in Mesopotamia, 1 in Palestine, 7 in Egypt, 1 in Gibraltar, 1 in Gallipoli, 4 in Africa, 4 in India, 1 in Hong Kong, 9 joined the Navy and 2 the Flying Corps; the remaining 32 have been on home service. Tubercle bacilli had been demonstrated in the sputum of 84 of the 126 patients. Of this number 35 were cases of early disease (Group I.), 43 had signs of moderately advanced disease (Group II.), and 6 had suffered from advanced disease (Group III.). Of the remaining 42 patients, in whose sputum tubercle bacilli were not demonstrated, 36 were classed in Group I. and 6 in Group II. Of the 43 officers and 2 army nursing sisters who received treatment in the Sanatorium last year, 9 of the officers and 1 of the sisters have resumed duty. The statistical research has revealed the great prognostic significance of the disappearance of T.B. from the sputum during a patient's residence in the Sanatorium. Briefly, taking male mortality rates as an index, while the ratio of actual to expected deaths among patients who leave the Sanatorium with T.B. in the sputum is 32·1, the ratio for those who on admission have T.B. in the sputum, but who leave with sputum clear of the specific organism, is 7·9. The proportion of all cases treated in the Sanatorium in which T.B. disappears from the sputum is, therefore, of more than academic interest. The following data consist of the records for a period of eleven consecutive years of the number of cases in Groups I., II., and III., as defined by the Turban-Gerhardt classification, which on admission had T.B. in the sputum, and the number and percentage of the same in which at the date of discharge T.B. could no longer be demonstrated. It is to be added that the duration of residence in the Sanatorium varied from a minimum of a few weeks to

a maximum of fourteen months, the average working out at some four to six months, and that, except during the years 1911 to 1914 inclusive, the treatment consisted of general hygienic measures only. During these particular years tuberculin was given, in addition to the usual Sanatorium treatment, in a varying number of cases. Actually during 1911 the percentage of T.B. + cases which received tuberculin was 13·0; during 1912, 76·4; during 1913, 61·0; and during 1914, 23·2. Therefore, it is in the records of 1912-13 and 1913-14 that indications of the effect of tuberculin treatment are to be looked for. Of 318 T.B. + cases classed in Group I. discharged during the eleven years under consideration, 138, or 43·3 per cent., had a negative sputum when they left the Sanatorium. Of 1,011 T.B. + cases classified in Group II., 227, or 22·4 per cent., were discharged with T.B. no longer to be demonstrated in the sputum. Of 703 T.B. + cases classified in Group III., the disappearance of the bacilli from the sputum was obtained in 32 only, or less than 5 per cent. The records of loss of T.B. (43·3 per cent.) for cases in Group I. are satisfactory evidence of the value of Sanatorium treatment in the initial stages of the disease. The relatively poor results obtained among the large, and therefore the more important, group of moderately advanced cases (Group II.) suggest that for this class of patient an average of some four to six months' treatment is inadequate. Considerable fluctuations in the percentage figures for loss of T.B. is to be noted year by year. Among the Group I. cases the minimum was 24·4 per cent., and the maximum 62·5 per cent., occurring in the years 1910-11 and 1916-17 respectively. Tuberculin was not given at the Sanatorium in either of these years, and in every respect the principles of treatment were identical. Among the Group II. cases the variation was less marked—namely, from a minimum of 16·1 per cent. to a maximum of 25·4 per cent. Similarly, among the Group III. cases there was a variation of from 0 per cent. to 11·2 per cent. It is not easy to explain these variations with any confidence. An examination of the meteorological records of the Sanatorium does not suggest any association with the climatic conditions which characterized the different years. As previously stated, the methods of treatment remained constant with the exception of the tuberculin era, but the fluctuations clearly are independent of the factor of specific treatment. Dr. Bardswell suggests that a variation in the clinical condition of the patients admitted from time to time offers the most likely explanation. The more favourable results are the outcome of a better, although to a large extent an unconscious, selection of cases. For instance, of a number of patients who come within the definition of Group I., some proved to be possessed of much greater recuperative power than others. In some instances T.B. were not found after the first examination—namely, on admission; in many not later than the eighth week. Patients with widely diverse lesions are included in this group of "early loss of bacilli," the common factor being a good response to treatment. Many patients, on the other hand, did not lose their T.B. until the completion of three, four, or six months' residence and longer. On the whole, the tendency is for the disappearance of T.B. to occur during the first twelve weeks of treatment. If they are still present after this period, the probabilities are that a further three months will not bring about their disappearance. This is but another way of stating that it

is patients who show the greatest tendency to spontaneous arrest of their disease that make the best and most rapid recoveries under Sanatorium conditions. The larger number of such cases included among the admissions during any given year will be reflected in the percentage figures for disappearance of T.B. It has been claimed that when tuberculin is given in addition to the usual hygienic measures employed at a Sanatorium the probability of T.B. disappearing from the sputum is increased. Dr. Bardswell does not think that any influence of tuberculin can be discovered in the Midhurst records. The percentage figures for the two years during which tuberculin was so largely used—namely, 1912-13 and 1913-14—are practically the same as the records for two years subsequent to this period—namely, 1915-16 and 1916-17—during which tuberculin was not employed at all. The tables setting forth the statistics regarding ultimate results are of exceptional interest. It is much to be wished that other Sanatoria could express their experience in some such scientifically expressed form as has been adopted for the Midhurst cases.

NOTES AND RECORDS.

At the Royal Institute of Public Health, 37, Russell Square, W.C. 1, there is to be a special course of lectures and demonstrations on Tuberculosis for medical men and women qualifying to become tuberculosis officers, and for general practitioners and others interested in the study of tuberculosis, as follows: January 15, "Schemes and Methods in Tuberculosis Work," by Professor E. W. Hope, of Liverpool. January 22, "A Practical Demonstration of the Work of the Tuberculosis Department, Poplar" (at Poplar Dispensary for the Prevention of Consumption, 135, Bow Road, E. 3), by Dr. T. D. Lister. January 29, "Tuberculosis in Relation to Life Assurance," by Dr. Otto May. February 5, "Climate in Tuberculosis," by Dr. E. C. Morland. February 12, "The Work of a Tuberculosis Department," by Dr. Donald P. Sutherland. February 19, "The Problem of Immunity in Tuberculosis," by Dr. S. Roodhouse Gloyne. February 26, "Some Pathological Aspects of Tuberculosis," by Dr. W. E. Carnegie Dickson. March 4, "Hospital Treatment of Pulmonary Tuberculosis," by Dr. T. Gwynne Maitland. March 11, "X-Rays in the Diagnosis of Tuberculosis," by Dr. H. Martin Berry. March 18, "Suggested Reforms in the Campaign against Tuberculosis," by Dr. S. Vere Pearson.

It is with profound sorrow that we record the death of Sir William Osler, Bart., the Regius Professor of Medicine in the University of Oxford. The passing of this great Master of Medicine robs the Anglo-Saxon world of an inspiring personality, a brilliant leader in the pursuit of Truth, a high-souled servant in the service of suffering humanity, and a true friend of every student of the science and art of healing. To Sir William Osler all rendered affection and homage. In the tuberculosis campaign he was ever ready to give his personal influence, wise counsel, and practical assistance to all scientifically directed endeavours. Recently he had favoured us with communications which have testified to his interest in this Journal and the cause it seeks to serve. Sir William Osler has won world-wide renown and respect, and his students and friends and colleagues on both sides of the Atlantic, and in many other far distant lands, have lost a rare and greatly valued friend.